SHOP MANUAL

HONDA

250·350

MODELS

CB250

CL250

CB350

CL350

FOREWORD

This Manual is a guide to the inspection and servicing of the Honde motorcycle, Hon 250/350, Models CB250/350 and CL250/350.

The CL350 is used as a base for this manual, therefore, the photographs and drawings are of this model. However, since all models are practically identical, the information contained will apply equally well to the other models.

Any information which are peculiar to any of the models will be identified to the applicable model by the use of the codes listed below.

Applicable To	Code
All CB/CL250, 350 models	Honda 250/350
All CB250, CB350 models	CB250/350
All CL250, CL350 models	CL250/350
All CB250, CL250 models	CB/CL250
All CB350, CL350 models	CB/CL350

Service and maintenance procedures are outlined in detail to enable the shop personnel to locate the problems rapidly and make repairs with much saving in time.

This manual has been prepared by major groups, assemblies and sections for easy use. Further, all work procedures are descriptive and accompanied by many photographs and drawings for clarity.

Changes to any portion of this manual or supplement information will be notified by the Service Bulletin.

Keep in mind that proper servicing produces satisfied customer and satisfied customer is good business.

HONDA MOTOR CO., LTD.

SERVICE DIVISION

FEATURES

The engines used on these model have the inlet and exhaust system designed to provide high output and the functional components are layed out efficiently for high performance. The frame effectively utilizes the combination of steel sheet and tubing to produce a lightweight and sturdy unit. Further, the motorcycles are designed to withstand high speed riding, operation on rough roads and other unusual road conditions. The CL model engines are based on the CB model engine with the following changes : ① different valve timing, ② different carburetor setting, and changes have also been made to part of the frame for conversion to a sports motorcycle for touring and riding over rough fields.

ENGINE

1. Engine design is of a 4 cycle aircooled, side-by-side, vertical twin cylinder, overhead camshaft gasoline engine.
2. The cylinder head is an aluminum alloy casting made independent of the camshaft and rocker arm support housing for greater strength and effective cooling.
3. Tappet clearance adjustment
   Adjustment for the tappet clearance is made by rotating the eccentric rocker arm pin.
4. Valve mechanism
   The camshaft is driven by an endless cam chain drive system which is kept under constant tension by an automatic hydraulically operated chain tensioner. Further, the chain guide roller is installed to provide smooth chain operation under all types of operating condition, assuring quiet and trouble free service.
5. Carburetor
   The carburetor is a variable venturi type which automatically operates the throttle valve by the suction pressure and provide a venturi opening consistant with the engine speed. The operation of the throttle grip is constantly maintained to provide engine speed without overloading.
6. Crankshaft
   Ball bearing is used to mount the right side while needle bearings are used for the center and left side mounting.
7. Primary reduction
   The use of the double spur gear has eliminated the noise and increased the service life of the gears.

8. Lubrication

   Plunger type pump is used to provide the pressure to the oil pressure lubricating system. Further, a system of dual filters, centrifugal and filter element, is employed to improve the filtration and minimize the wear to the component parts.

9. The CL models use essentially the same engine as the CB models with the exception of the difference in exhaust and the valve timing. This will change the output curve toward the lower end of the speed range and improve the operation on rough fields.

FRAME

1. Frame body

   The structural members of the main frame unit are constructed of steel sheet and tubing into an efficient semi-double cradle design featuring light weight and high strength.

2. Front and rear suspension

   Front suspension is a telescopic hydraulic damper type ; the bottom case is made of aluminum alloy for lightness. Rear suspension is a swing arm type of tubular constructed for greater strength. Further, both cushions utilizes longer stroke for comfortable riding.

   The handle is a raised type designed wide for operating equally well on highway or rough fields.

3. Tire

   Large tires are used on both wheels, for good stability and improved riding comfort, 3.00–18 on the front and 3.50–18 on the rear.

   The CL250/350 uses 3.00–19 on the front and 3.50–18 on the rear, the use of the large size tires with block tread pattern assures higher stability on rough uncharted fields.

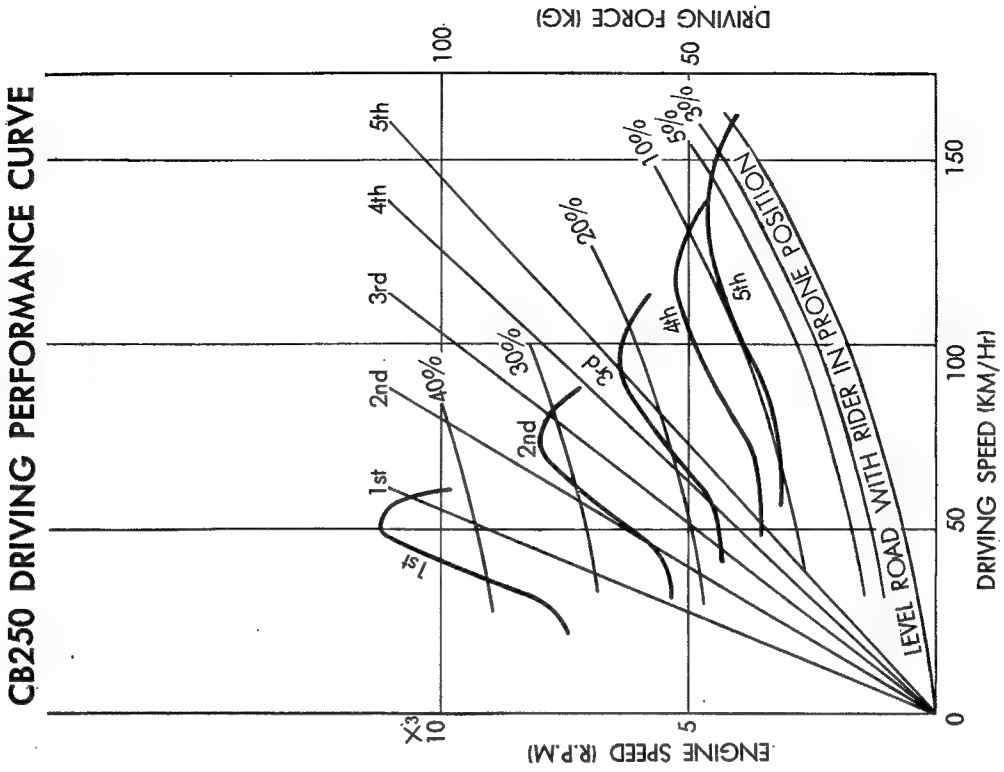
CONTENTS

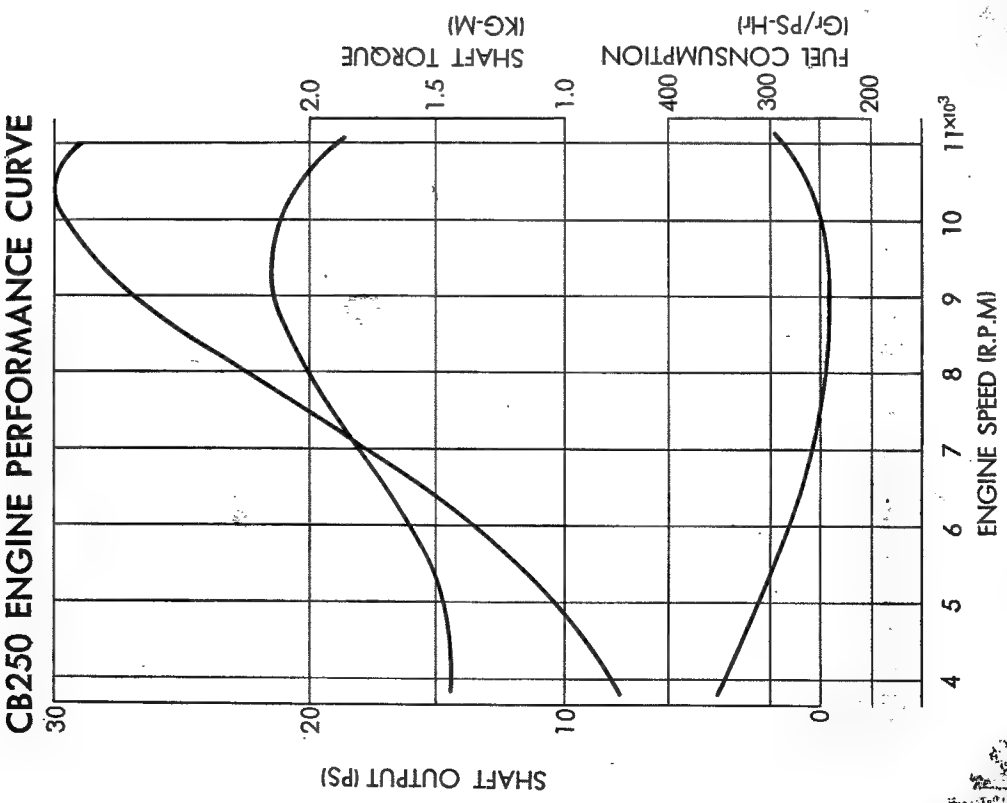
1. TECHNICAL DATA

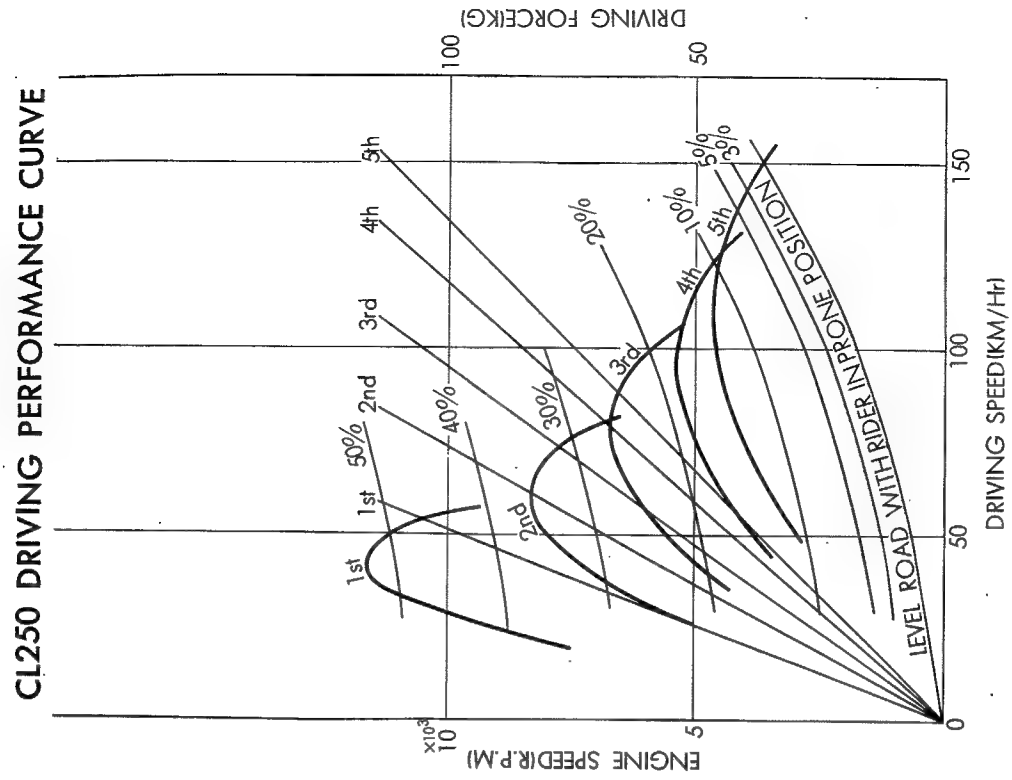
* Indicate U.S.A. type

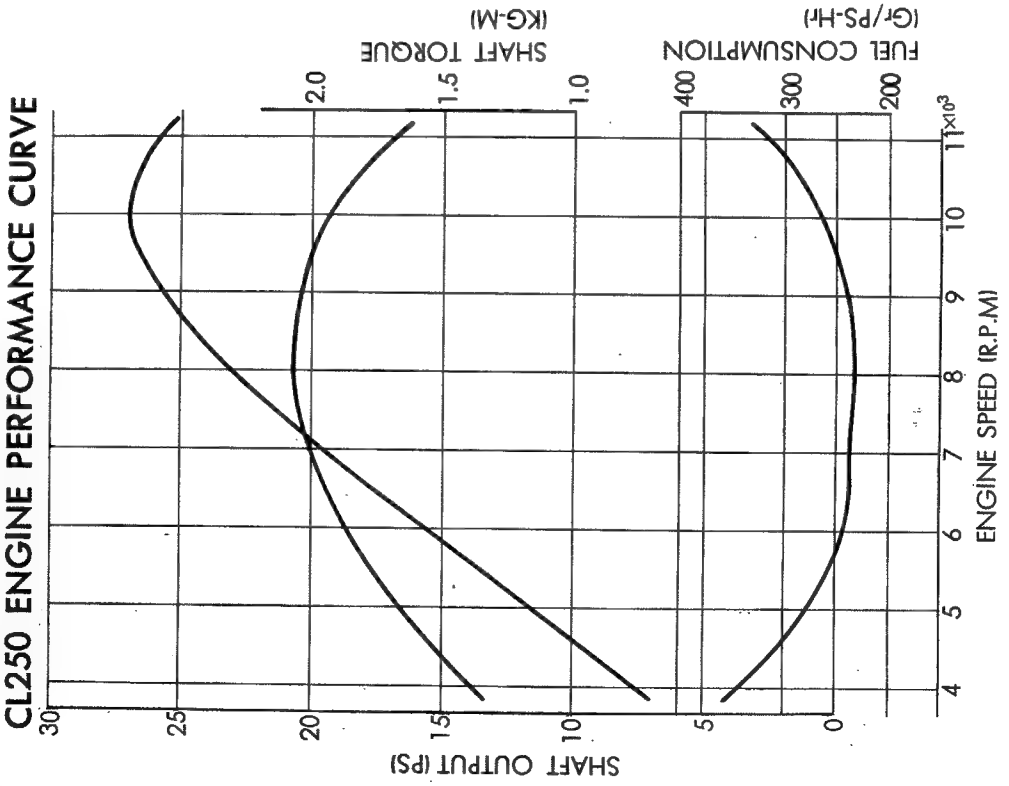
Item \ Model	CB250	CL250	CB350	CL350
DIMENSIONS				
Overall length	2090 mm (82.3 in)	2100 mm (82.7 in)	* 2010 mm (79.2 in) 2090 mm (82.3 in)	* 2020 mm (79.5 in) 2100 mm (82.7 in)
Overall width	775 mm (30.5 in)	830 mm (32.7 in)	775 mm (30.5 in)	830 mm (32.7 in)
Overall height	1075 mm (42.3 in)	1090 mm (42.9 in)	1075 mm (42.3 in)	1090 mm (42.9 in)
Wheel base	1320 mm (52.0 in)	Same as left	1320 mm (52.0 in)	Same as left
Ground clearance	150 mm (5.9 in)	180 mm (7.1 in)	150 mm (5.9 in)	180 mm (7.1 in)
Curb weight	160 kg (352.8 lb)	157 kg (345.4 lb)	160 kg (352.8 lb)	157 kg (345. 4 lb)
Weight distribution F/R	96/124 kg (211.7/273.4 lb)	91/126 kg (200.7/277.8 lb)	96/124 kg (211.7/273.4 lb)	91/126 kg (200.7/277.8 lb)
FRAME				
Type	Semi-double, cradle	Same as left	Same as left	Same as left
Suspension, front	Telescopic fork	Same as left	Same as left	Same as left
Suspension, rear	Swinging arm	Same as left	Same as left	Same as left
Tire size, front	3.00–18 (4 PR)	3.00–19 (4 PR)	3.00–18 (4 PR)	3.00–19 (4 PR)
Tire size, rear	3.25–18 (4 PR)	3.50–18 (4 PR)	3.50–18 (4 PR)	3.50–18 (4 PR)
Brake, front. lining area	Internal expansion, 52.2 $cm^2 \times 2$		Same as left	Same as left
Brake, rear, lining area	Internal expansion, 51.0 $cm^2 \times 2$		Same as left	Same as left
Fuel capacity	12 lit. (3.2 US gal., 2.6 Imp. gal.)	9 lit. (2.4 US gal., 2.0 Imp. gal.)	12 lit. (3.2 US gal., 2.6 Imp, gal.)	9 lit. (2.4 US gal., 2.0 Imp. gal.)
Caster angle	63°	Same as left	Same as left	Same as left
Trail length	85 mm (3.35 in)	95 mm (3.74 in)	85 mm (3.35 in)	95 mm (3.74 in)
ENGINE				
Type	O.H.C. twin cyclinder, air-cooled 4-stroke		Same as left	Same as left
Cylinder arrangement	Vertical, twin parallel.		Same as left	Same as left
Bore and stroke	56 × 50.6 mm (2.205 × 1.992 in)		64 × 50.6 mm (2.52 × 1.992 in)	
Displacement	249 cc (15.21 cu-in)	Same as left	325 cc (19.8 cu-in)	Same as left
Compression ratio	9.5	Same as left	Same as left	Same as left
Carburetor	Constant velocity type, Keihin		Same as left	Same as left
Valve train	Chain driven overhead camshaft		Same as left	Same as left
Max. horsepower	30 PS/10500 rpm	27 PS/10,000 rpm	36 PS/10,500rpm	33 PS/9,500 rpm
Max. torque	2.14 kg-m/9,500 rpm (15.5 ft-lb/9,500 rpm)	2.07 kg-m/8,000 rpm (15 ft-lb/8,000 rpm)	2.55 kg-m/9,500 rpm (18.5 ft-lb/9,500 rpm)	2.69 kg-m/8,000 rpm (19.5 ft-lb/8,000 rpm)

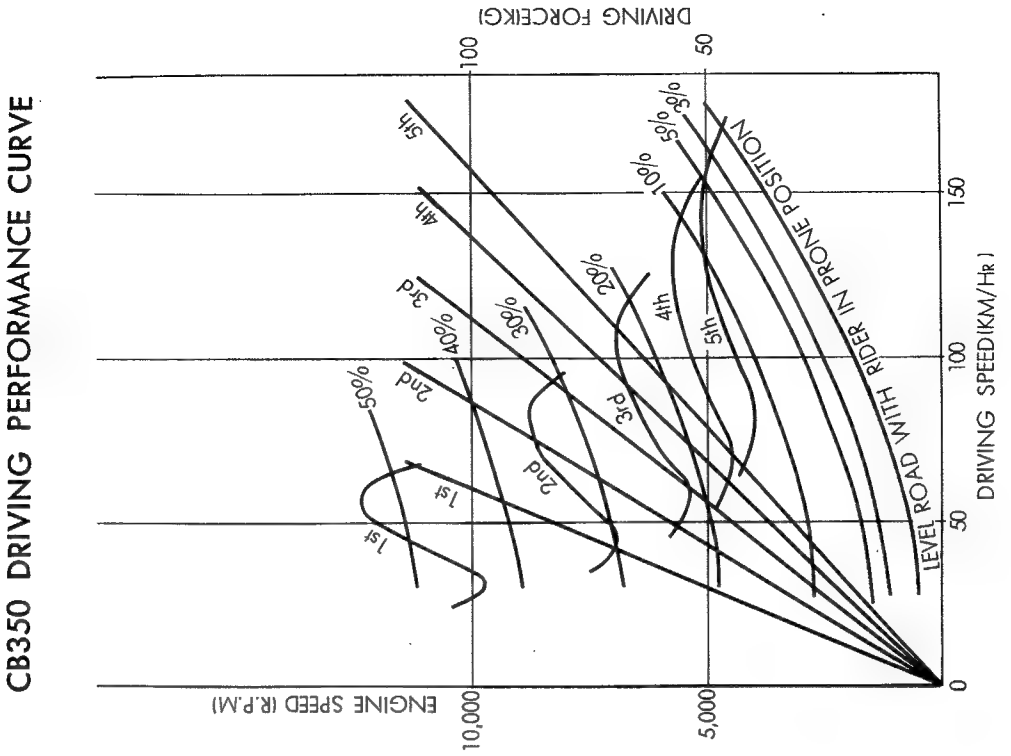
Item \ Model	CB250	CL250	CB350	CL350
Oil capacity	2 lit. (2.1 U.S. quart, 1.8 Imp. quart)	Same as left	Same as left	Same as left
Lubrication system	Forced and wet sump	Same as left	Same as left	Same as left
Fuel required	Octance number above 95	Same as left	Same as left	Same as left
Engine weight (Include oil)	52.5 kg (115.5 lb)	Same as left	Same as left	Same as left
DRIVE TRAIN				
Clutch	Wet, multi-plate type	Same as left	Same as left	Same as left
Transmission	5 speed forward, constant mesh		Same as left	Same as left
Primary reduction	3.714	Same as left	Same as left	Same as left
Gear ratio 1st	2.353	Same as left	Same as left	Same as left
2nd	1.636	Same as left	Same as left	Same as left
3rd	1.269	Same as left	Same as left	Same as left
4th	1.036	Same as left	Same as left	Same as left
5th	0.900	Same as left	Same as left	Same as left
Final reduction	2.375	2.625	2.250	2.375
ELECTRICAL				
Ignition	Battery	Same as left	Same as left	Same as left
Starting system	Motor and Kick	Same as left	Same as left	Same as left
Battery capacity	12V–12AH	Same as left	Same as left	Same as left
Spark plug	NGK B–8ES	Same as left	Same as left	Same as left
PERFORMANCE				
Max. Speed in gear 1st	58 kph (36 mph)	55 kph (34.2 mph)	60 kph (37.3 mph)	58 kph (36 mph)
Max. Speed in gear 2nd	85 kph (52.8 mph)	80 kph (49.7 mph)	90 kph (55.9 mph)	85 kph (52.8 mph)
Max. Speed in gear 3rd	113 kph (70.2 mph)	105 kph (65.2 mph)	120 kph (74.5 mph)	114 kph (70.8 mph)
Max. Speed in gear 4th	140 kph (87 mph)	130 kph (80.7 mph)	148 kph (91.9 mph)	140 kph (87 mph)
Max. Speed in gear 5th	160 kph (100 mph)	150 kph (93.2 mph)	170 kph (105.6 mph)	160 kph (100 mph)
Fuel consumption	45 km/lit. at 50 kph (106 mile/US gal., 127 mile/Imp. gal. at 31 mph)		45 km/lit. at 60 kph (106 mile/US gal., 127 mile/Imp. gal. at 37 mph)	
Climbing ability	20°	20°	20°	20°
Turning circle	4.2 m (13.8 ft)	4.4 m (14.4ft)	4.2 m (13.8 ft)	4.4 m (14.4 ft)
Braking distance	14.5 m at 50 kph (47.6ft at 31 mph)	Same as left	14 m at 50 kph (46 ft at 31 mph)	Same as left

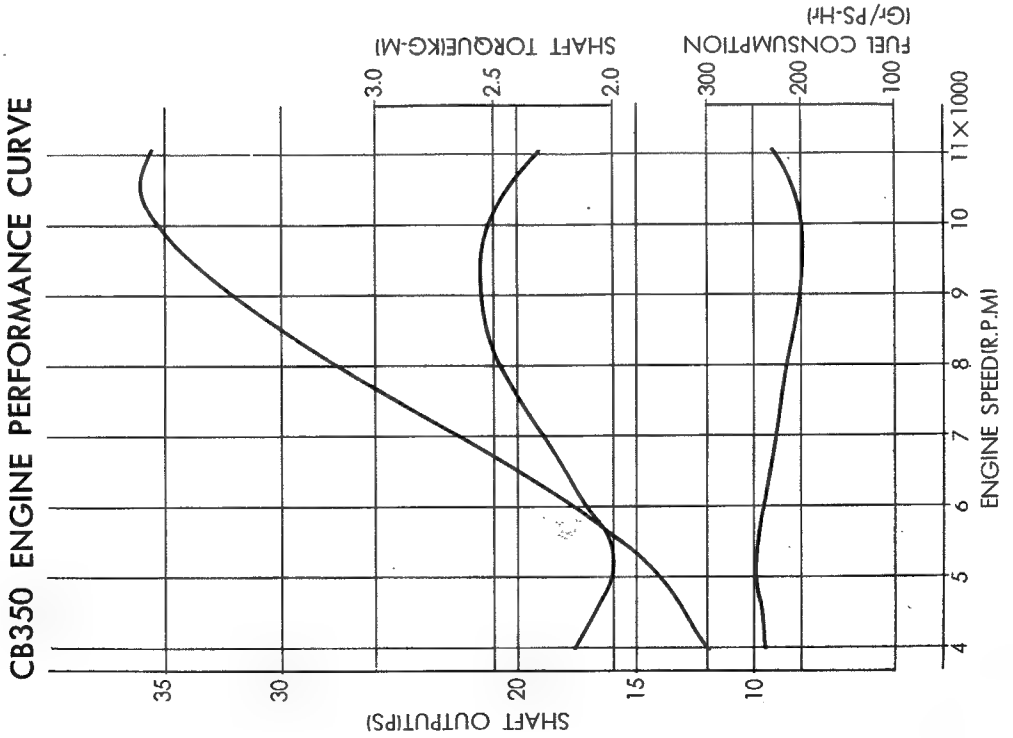

CB250 DRIVING PERFORMANCE CURVE
DRIVING FORCE (KG)
100
50
0
150
100
50
0
DRIVING SPEED (KM/Hr)
ENGINE SPEED (R.P.M)
X3
10
5
0
1st
2nd
3rd
4th
5th
40%
30%
20%
10%
5%
3%
LEVEL ROAD WITH RIDER IN PRONE POSITION


CB250 ENGINE PERFORMANCE CURVE
SHAFT TORQUE (KG-M)
FUEL CONSUMPTION (Gr/PS-Hr)
SHAFT OUTPUT (PS)
ENGINE SPEED (R.P.M)
2.0
1.5
1.0
400
300
200
30
20
10
0
4
5
6
7
8
9
10
11×10³

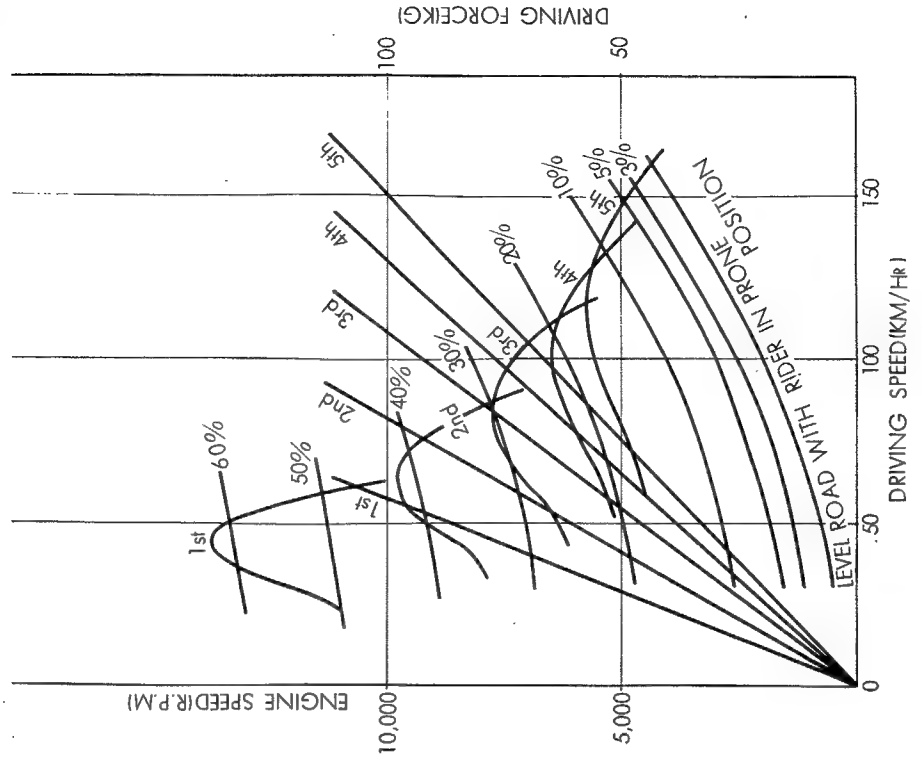

CL250 DRIVING PERFORMANCE CURVE
DRIVING FORCE(KG)
ENGINE SPEED(R.P.M)
DRIVING SPEED(KM/Hr)
LEVEL ROAD WITH RIDER IN PRONE POSITION
1st
2nd
3rd
4th
5th
50%
40%
30%
20%
10%
5%
5%


CL250 ENGINE PERFORMANCE CURVE
SHAFT OUTPUT (PS)
SHAFT TORQUE (KG-M)
FUEL CONSUMPTION (Gr/PS-Hr)
ENGINE SPEED (R.P.M)

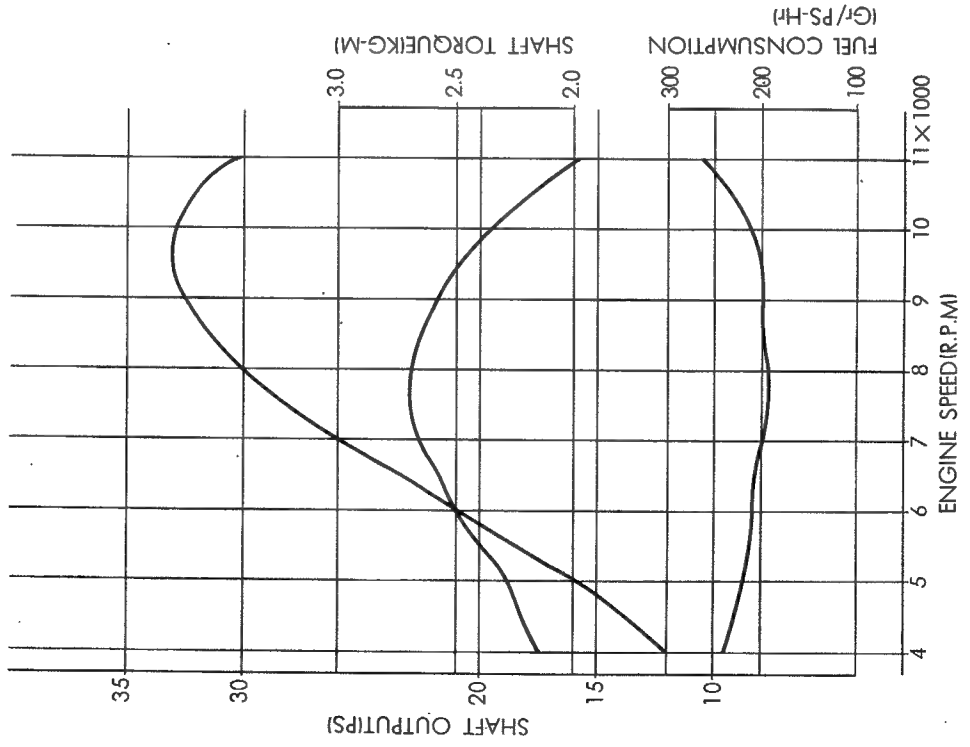

CB350 DRIVING PERFORMANCE CURVE
DRIVING FORCE(KG)
100
50
ENGINE SPEED (R.P.M)
10,000
5,000
0
50
100
150
DRIVING SPEED(KM/HR)
LEVEL ROAD WITH RIDER IN PRONE POSITION
5%
5%
10%
20%
30%
40%
50%
1st
2nd
3rd
4th
5th


CB350 ENGINE PERFORMANCE CURVE
SHAFT TORQUE(KG-M)
FUEL CONSUMPTION (Gr/PS-Hr)
SHAFT OUTPUT(PS)
35
30
20
15
10
3.0
2.5
2.0
300
200
100
4
5
6
7
8
9
10
11×1000
ENGINE SPEED(R.P.M)

CL350 DRIVING PERFORMANCE CURVE

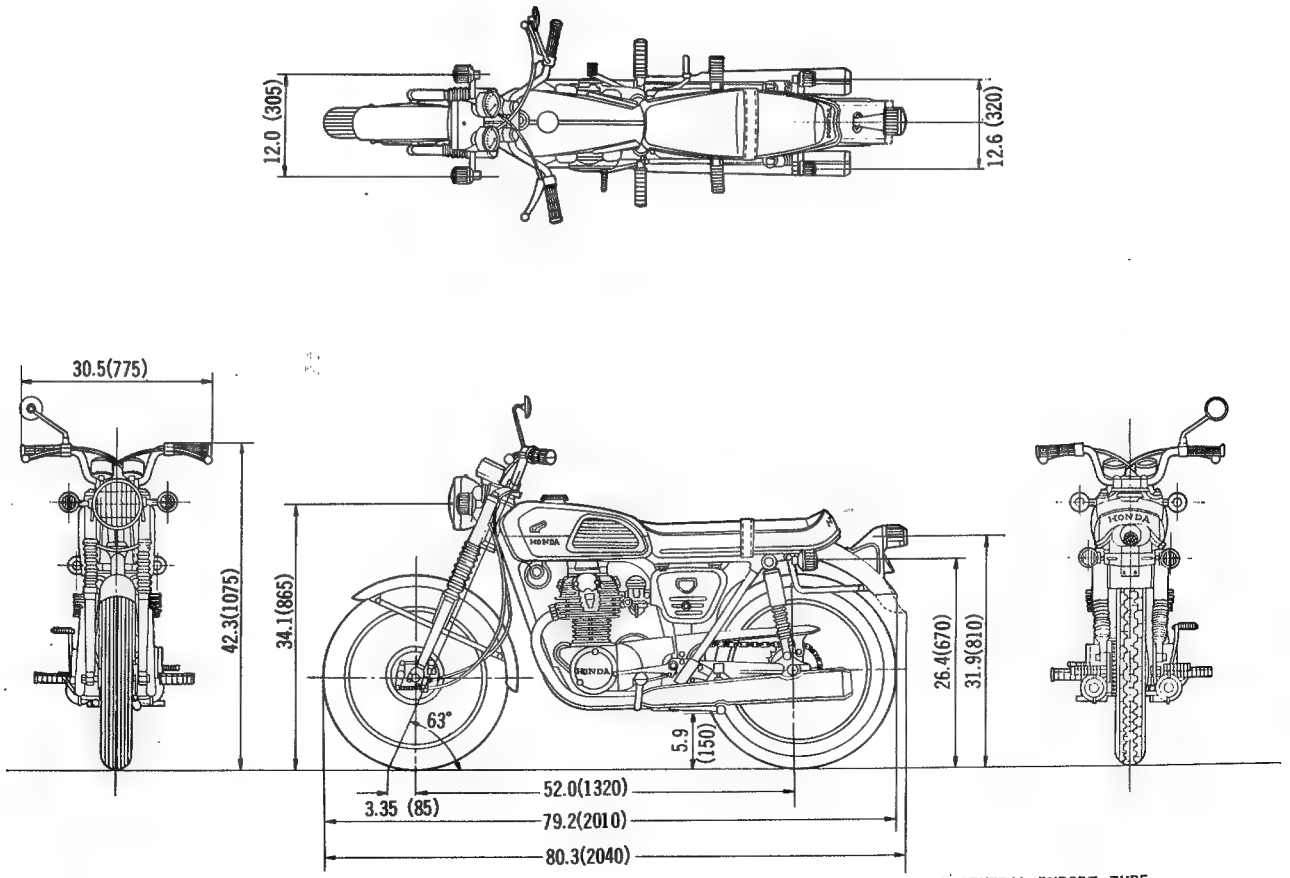


CL350 ENGINE PERFORMANCE CURVE



CB250/350 DIMENSIONAL DRAWING

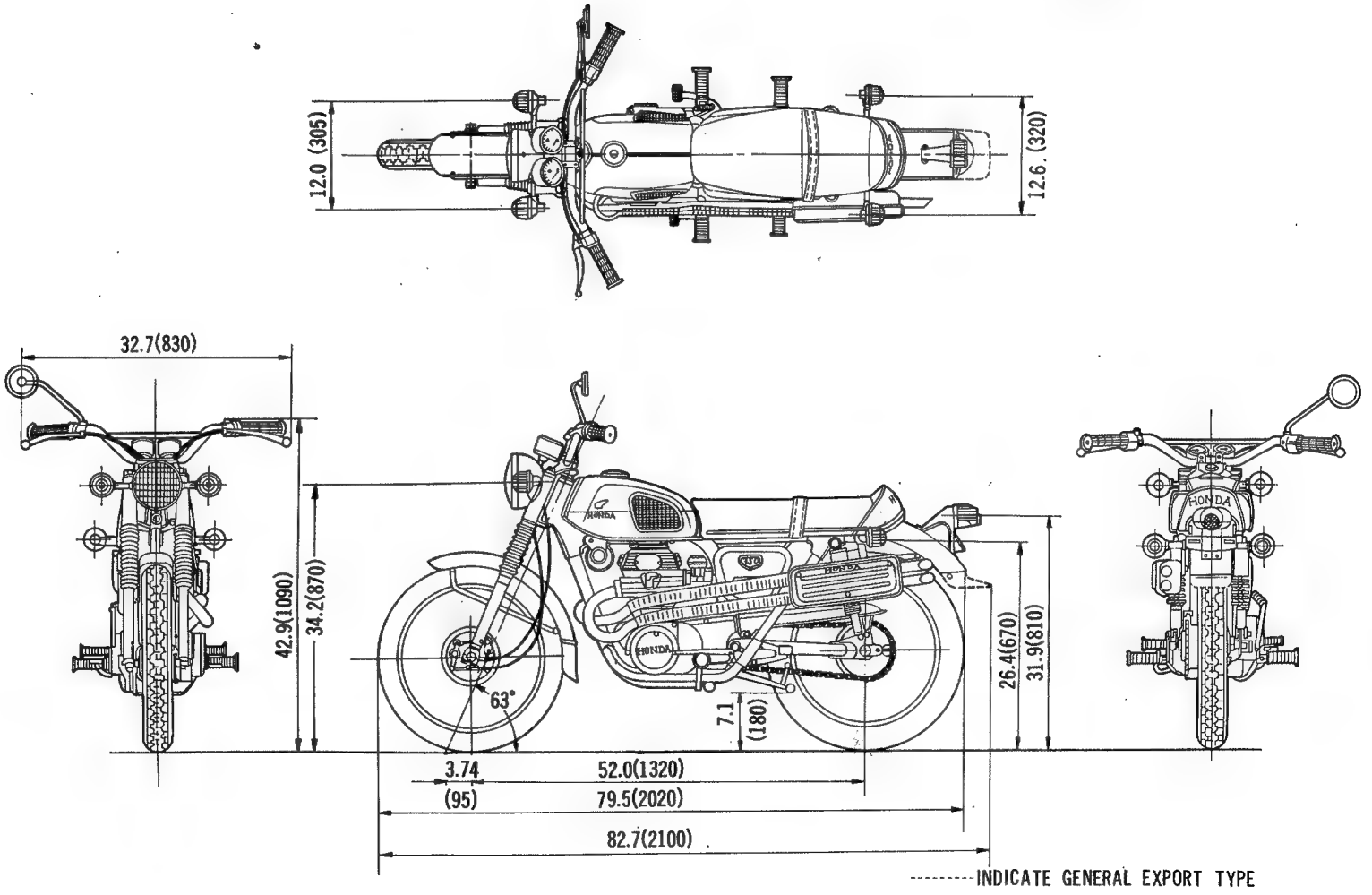
unit:inch(mm)



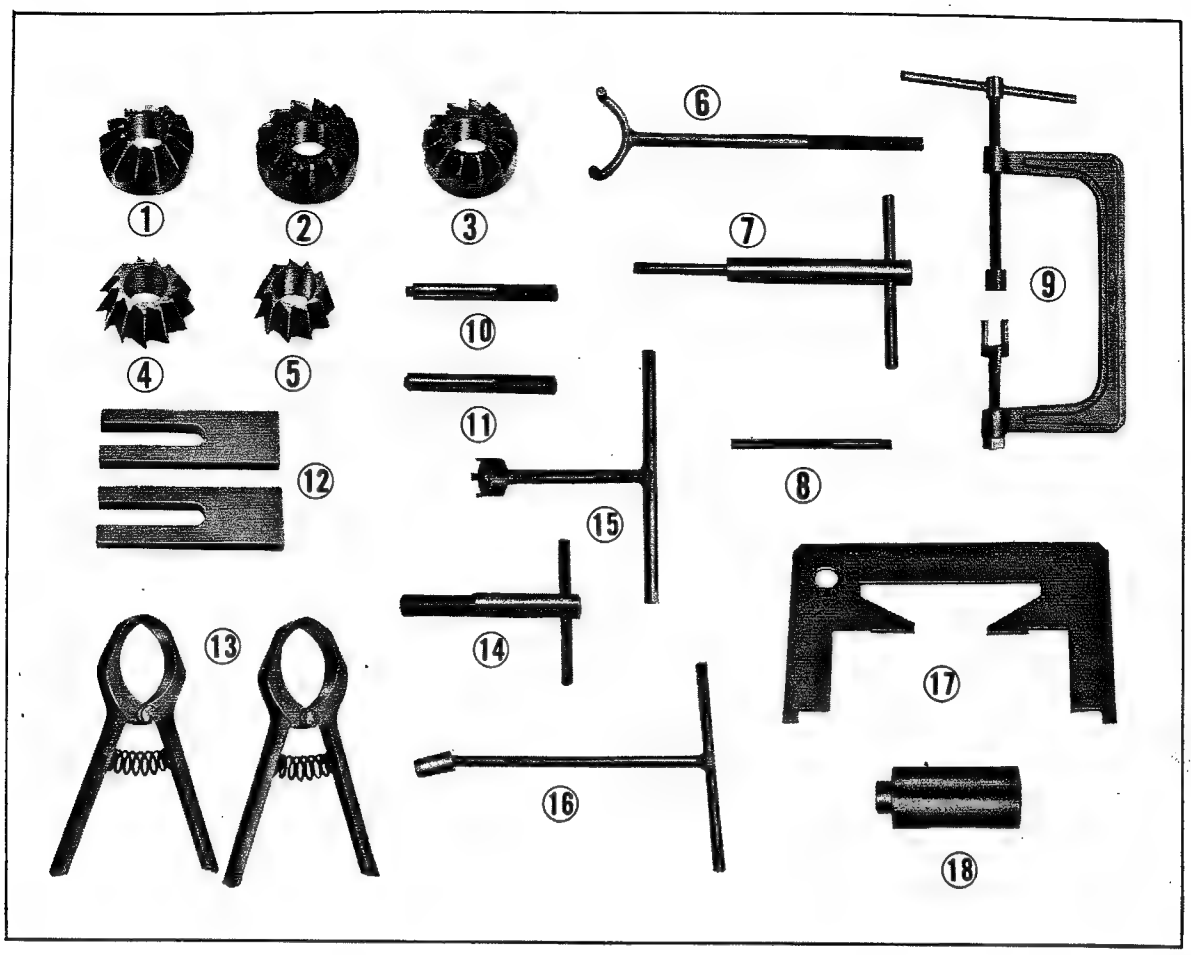
---------INDICATE GENERAL EXPORT TYPE

CL250/350 DIMENSIONAL DRAWING

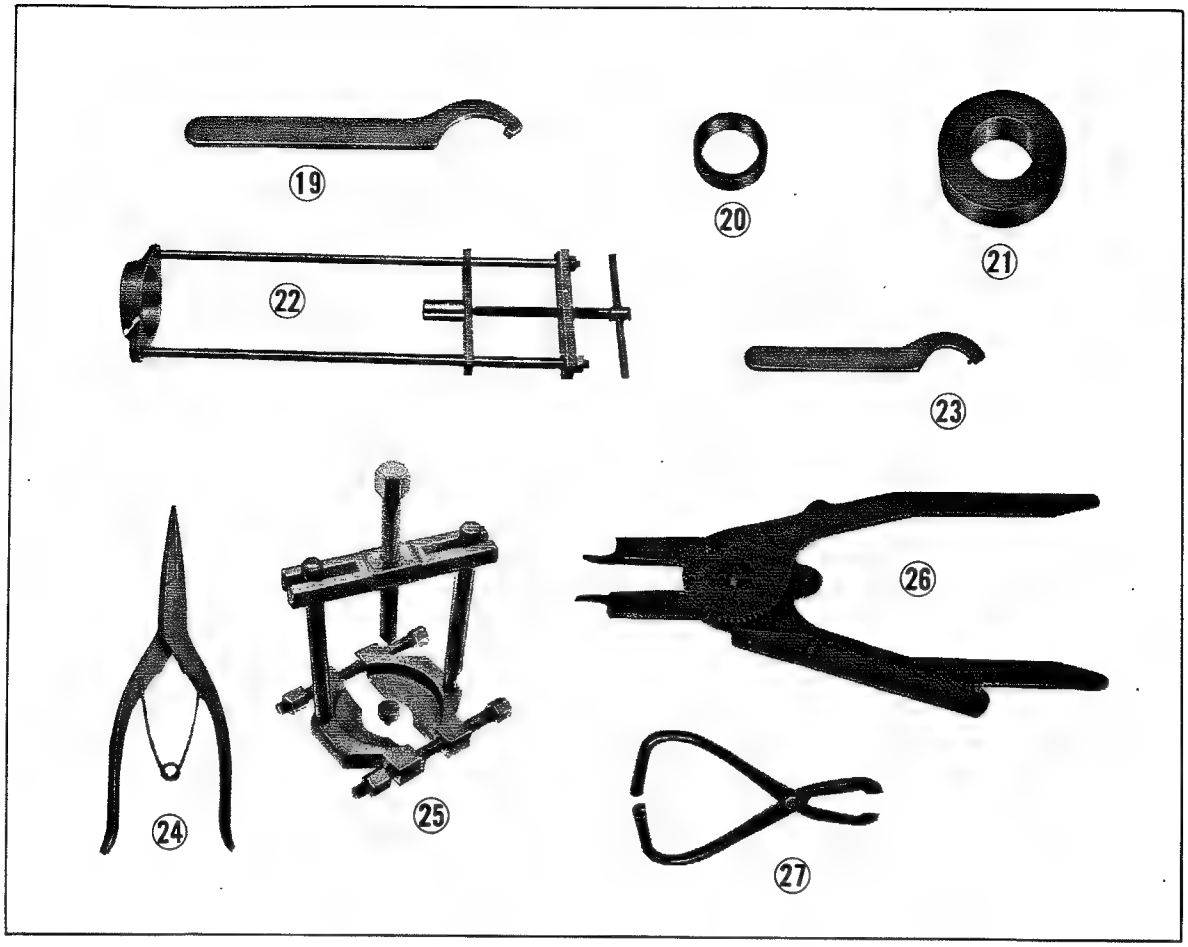
unit:inch(mm)



--------INDICATE GENERAL EXPORT TYPE



Ref. No.	Tool No.	Description
	07000–28601	Special tool set for (CB/CL250)
	07000–28701	Special tool set for (CB/CL350)
①	07001–28601	Valve seat cutter, 90°
②	07003–28601	Inlet valve seat top cutter
③	07004–28601	Exhaust valve seat top cutter
④	07005–28601	Inlet valve seat interior cutter
⑤	07006–28601	Exhaust valve seat interior cutter
⑥	07022–28601	Drive sprocket holder (CB/CL250)
	07022–28701	Drive sprocket holder (CB/CL350)
⑦	07007–25002	Valve seat cutter holder
⑧	07008–28601	Valve guide reamer, 7 mm
⑨	07031–25001	Valve lifter
⑩	07046–25901	Valve guide driving tool
⑪	07047–25901	Valve guide removing tool
⑫	07033–25001	Piston base (2 each)
⑬	07032–25101	Piston ring compressor (CB/CL250)
	07032–55101	Piston ring compressor (CB/CL350)
⑭	07011–21601	Generator rotor puller
⑮	07086–28301	Lock nut wrench, 16 mm
⑯	07093–28601	Universal joint box wrench, 10 mm
⑰	07144–99934	Carburetor float gauge (CB/CL250)
	07144–99935	Carburetor float gauge (CB/CL350)
⑱	07048–28601	Bearimg driving tool



Ref. No.	Tool No.	Description
⑲	07072–20001	Pin spanner, 48 mm
⑳	07054–27301	Front fork oil seal driving guide
㉑	07054–27302	Front fork oil seal driving weight
㉒	07035–28301	Rear cushion assembling and disassembling tool
㉓	07071–25001	Main switch pin spanner
㉔	07782–99919	Snap ring pliers
㉕	07784–99908	Universal bearing puller
㉖	07041–28301	Driven sprocket circlip pliers
㉗	07782–99920	Hose clip (2 each)
	07790–28601	Tool case (CB/CL250)
	07790–28701	Tool case (CB/CL350)

3. ENGINE

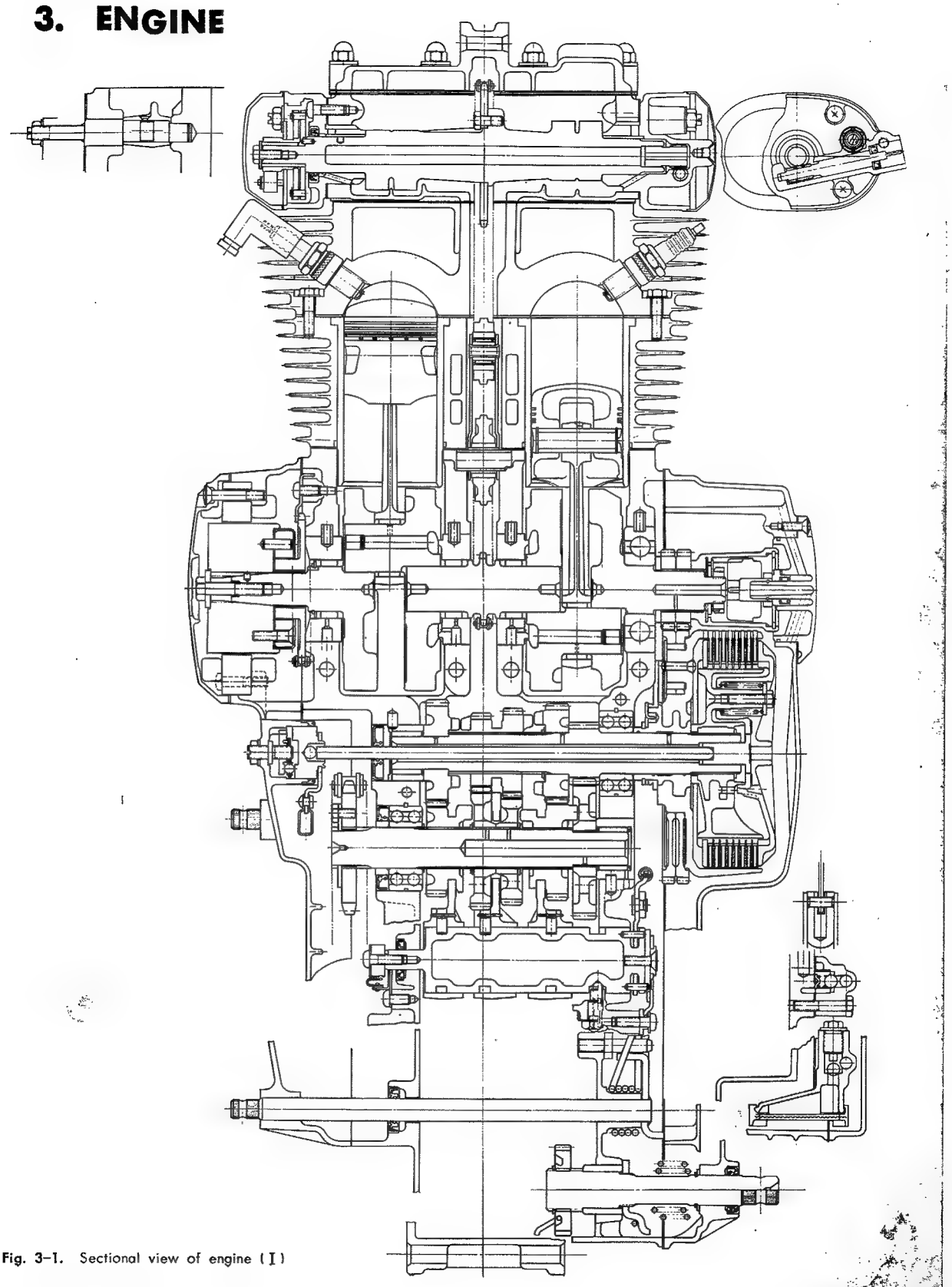


Fig. 3-1. Sectional view of engine (I)

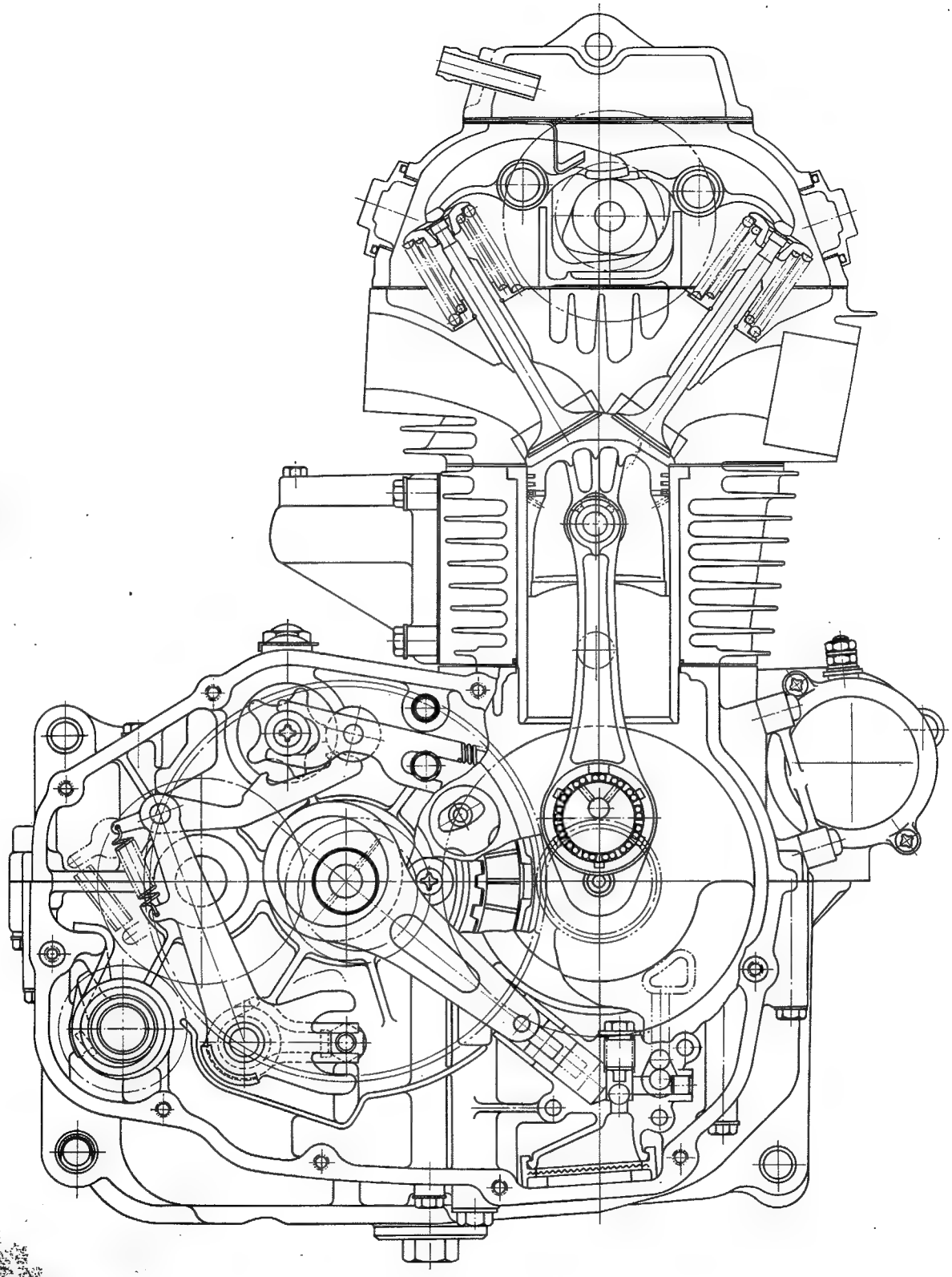


Fig. 3-2. Sectional view of engine (II)

3.1 ENGINE

A. Construction

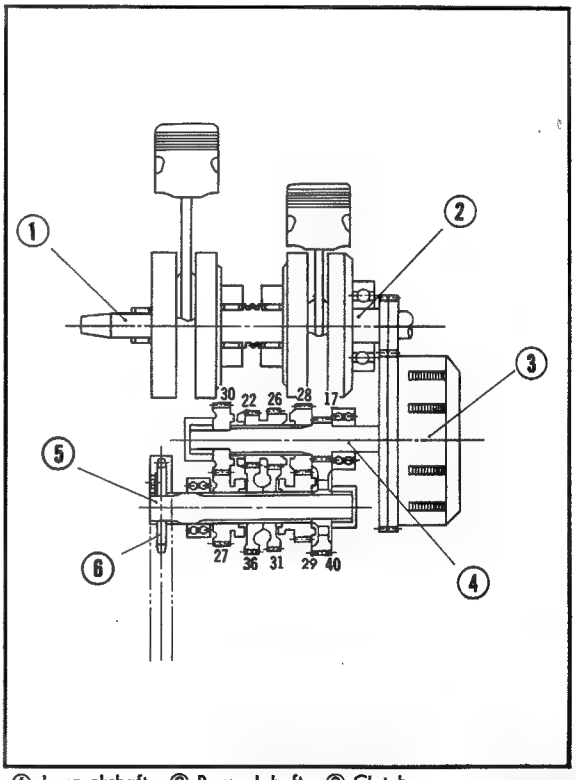
It is no exaggeration to state that the quality of the engine reflects the superiority of the motorcycle. An engine that is light in weight, compact, and having a large power output is a desireable feature, however, the engine must have a well balanced appearance which matches the frame in order to produce a perfect motorcycle.

These Model were designed to fulfill this aim by employing many new ideas and the latest in technology. The fruit of the effort is reflected in motorcycles of high performance and mechanical beauty, much sought after by avid riding fans. Features such as the twin cylinder overhead cam, double pitch valve springs (which eliminates surging during high speed), and a regulating mechanism featured with an eccentric rocker arm pin which practically eliminates tappet adjustment, are typical of the revolutionary features of these motorcycle. Also, the system of hydraulically actuated automatic tensioner suppresses the chain noise to the level which is unnoticeable ; extra heavy duty bearings at the crankshaft and the transmission, and the dual oil filtering system incorporating both the centrifugal and the filtering mesh filter enhance the durability and the long economical life of the engine. The two variable venturi systems for the CV carburetor assures uniform fuel mixture independently to the respective cylinders to provide smooth power output at all speed ranges.

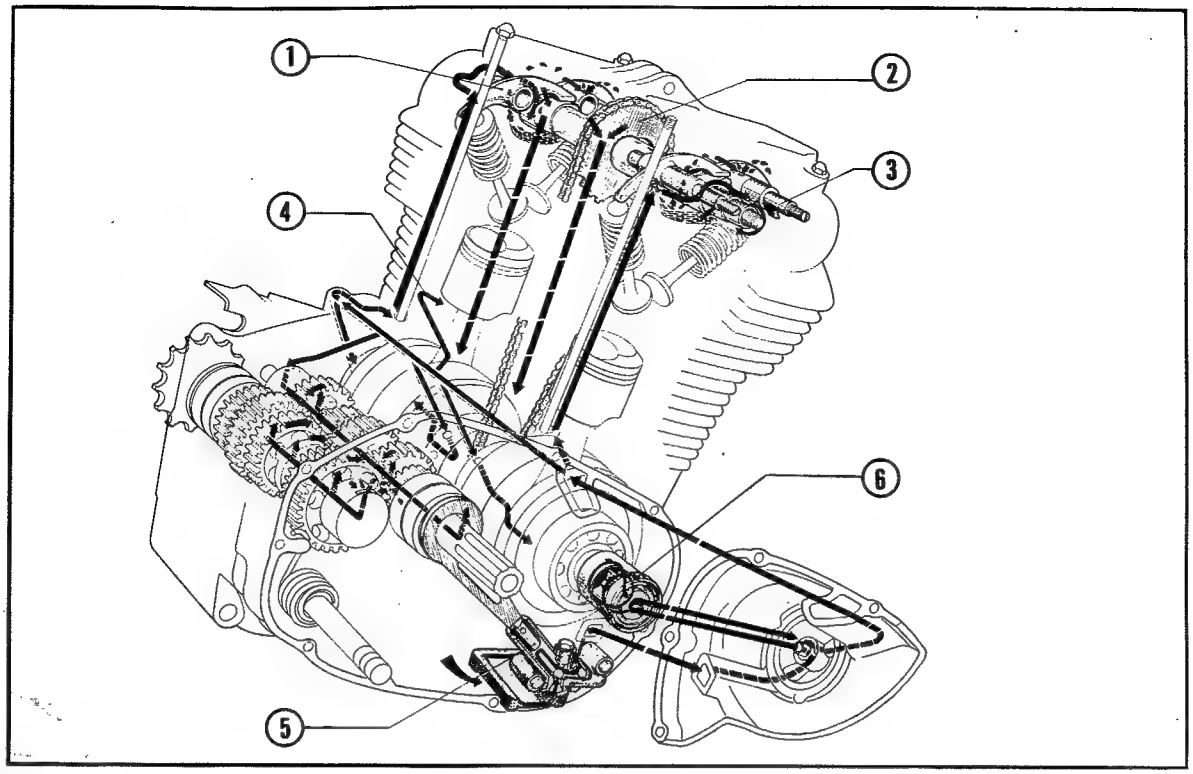
Power Transmission

The power generation sequence and its transmission to at the rear wheel for performing useful work is as follows :

Combustion → piston → connecting rod → crankshaft → primary drive gear → (primary driven gear) clutch outer → eight friction discs → eight clutch plates → clutch center → transmission mainshaft → mainshaft gear → countershaft gear → countershaft → drive sprocket → drive chain → rear wheel. (Refer to Fig. 3-3)



① L. crankshaft ② R. crankshaft ③ Clutch
④ Transmission mainshaft ⑤ Transmission countershaft
⑥ Drive sprocket
Fig. 3-3. Drive sequence



① Rocker arm ② Cam sprocket ③ Rocker arm pin ④ To cam chain tensioner ⑤ Plunger oil pump
⑥ Centrifugal oil filter
Fig. 3–4. Oil lubrication system

Lubrication

The various sections of the engine are lubricated by oil through the oil routing system :

Lower crankcase oil sump → filter screen → oil pump → lower crankcase → right crankcase cover → oil filter → right crankcase cover → upper crankcase → crankshaf, transmission mainshaft, cam-chain tensioner and camshaft. (Refer to Fig. 3–4)

In addition, the cam chain guide roller and valve springs are lubricated by oil splashed from the camshaft. The countershaft and kick starter pinion are also lubricated by oil thrown off from the oil pan.

B. Dismounting the Engine

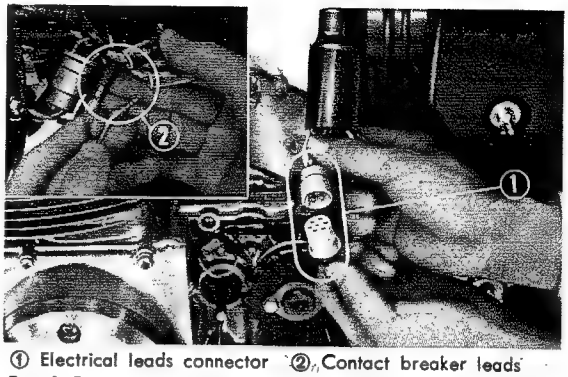
1. Fuel Tank

   Turn the fuel cock to the "STOP" position; remove the fuel lines from the cock and the fuel level tube, and raise the seat to remove the tank.

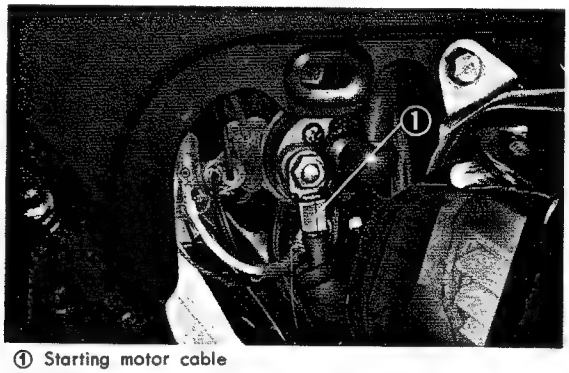
2. Remove the mufflers.
3. Clutch cable
   Remove the gear change pedal and step bar, and take off the L. crankcase rear cover.
4. Remove the drive chain.
5. Remove the rear brake pedal.
6. Carburetor

   Remove the throttle control cables from the carburetor; remove the left and right air cleaner cases and loosen the carburetor insulating bands.

7. Unplug the electrical cable connection. (Refer to Fig. 3-5)
8. Remove the contact breaker cable connection.
9. Remove the high tension terminal assemblies from the spark plugs.
10. Remove the starting motor cable. (Refer to Fig. 3-6)



① Electrical leads connector ② Contact breaker leads
Fig. 3-5. Removing the electrical leads



① Starting motor cable
Fig. 3-6. Removing the starting motor cable

11. Disconnect the tachometer cable at the engine.
12. Remove the 7 engine hanger bolts and dismount the engine from the right side. (Refer to Fig. 3-7)

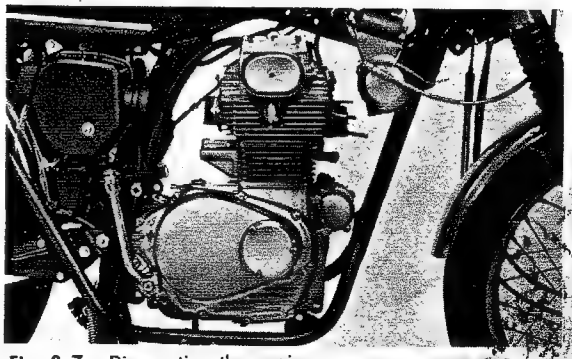
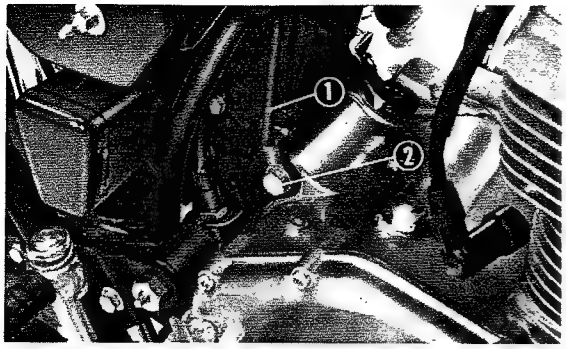
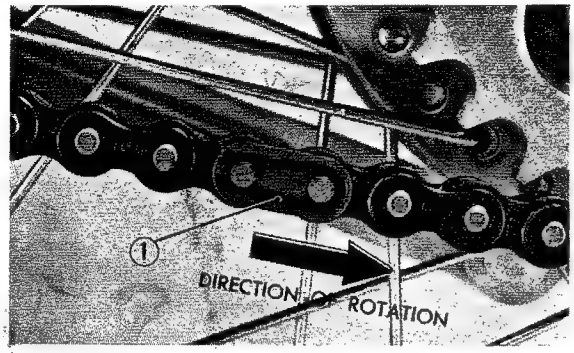


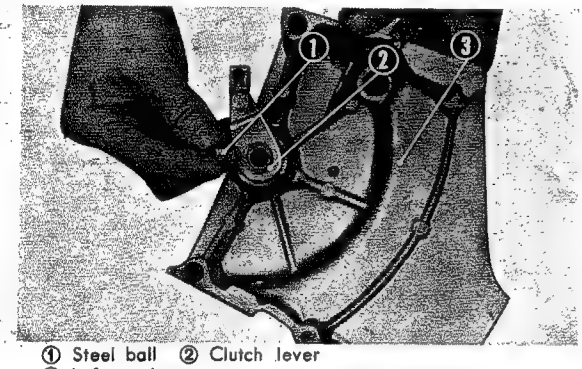
Fig. 3-7. Dismounting the engine



① Battery ground cable ② Engine hanger bolt
Fig. 3-8. Installing the battery ground cable



① Joint clip
Fig. 3-9. Drive chain joint clip direction



① Steel ball ② Clutch lever
③ Left crankcase rear cover
Fig. 3-10. Placing the steel ball

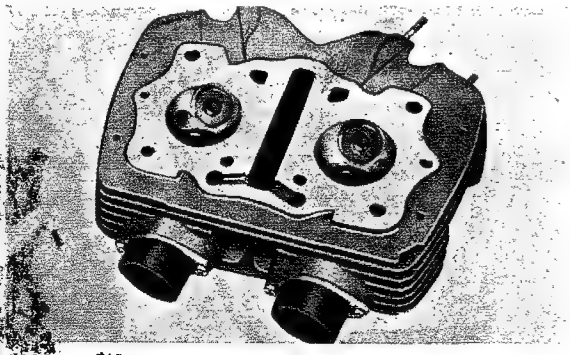


Fig. 3-11 Cylinder head

C. Remounting the Engine

Remount in the reverse sequence of dismounting.

NOTE :

- Insert the hanger bolts from the right side of the frame and tighten nuts from the left side. Install the battery ground cable from the right side. (Refer to Fig. 3-8)
- If the hanger bolts do not go in easily, do not force. Find the cause and make correction.
- When installing the battery ground cable, clean all rust and paint from the hanger bolt as well as from the terminal and the frame mounting area so that good contact is assured. (Refer to Fig. 3-8)
- Make sure the drive chain joint link clip is facing in the correct direction, the opening must be opposite to the direction of chain movement. (Refer to Fig. 3.9)
- Make sure that the steel ball has been assembled in the clutch lever before installing the left crankcase rear cover. (Refer to Fig. 3-10)

3.2 CAM CASE AND CYLINDER HEAD

A. Construction

The cylinder head is made independent of the camshaft and rocker arm support pin housing for greater strength and effective cooling. It is constructed of aluminum alloy and incorporates a semi-spherical combustion chamber. (Fig. 3-11)

Valves are actuated by rocker arm and camshaft, driven through a cam chain.

(SQUISH AREA)

This is the area in which part of the fuel mixture between the piston and cylinder head is compressed further at the end of the compression stroke to be injected into the main mixture, creating a swirl. The injected mixture is directed at the spark plug to increase the propagation of combustion. Even a lean or a slow burning fuel mixture will produce a smooth combustion with a reduced tendency toward engine "knock". (Refer to Fig. 3-12)

The use of the OHC (overhead camshaft) has reduced the reciprocating mass of the valve mechanism, further, the employment of the dual pitch valve spring makes it possible to obtain high speed and high output from the engine.

Also, the combustion efficiency has been greatly improved, since the valves may be ideally positioned and the spark plug located in the center of the combustion chamber for greater efficiency. (Refer to Fig. 3-13)

The flow of cooling air around the upper portion of the combustion chamber is effective and together with the good heat conductivity of the aluminum alloy head, the cooling efficiency has been increased notably.

The cylinder head cover also incorporates a breather. Inside the crankcase the pressure constantly fluctuates due to the reciprocating motion of the piston and the oil is quickly contaminated and deteriorates due to the gas generated by the high temperature. Blow-by from the combustion chamber causes a pressure build-up within the crankcase. In order to prevent this undesirable condition, the breather separates the oil within the labyrinth and exhausts the gas to the outside. Simultaneously, the breather also functions as an oil cooler. It also prevents the humidity in the atmosphere from entering the engine. (Refer to Fig. 3-14)

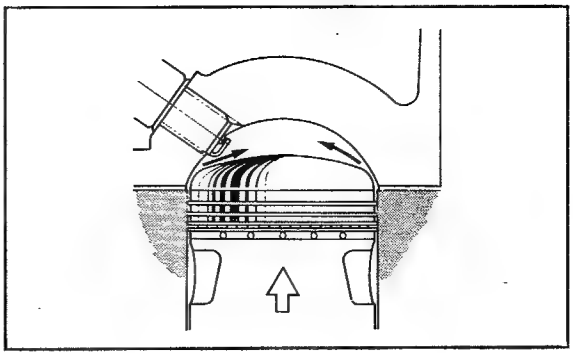
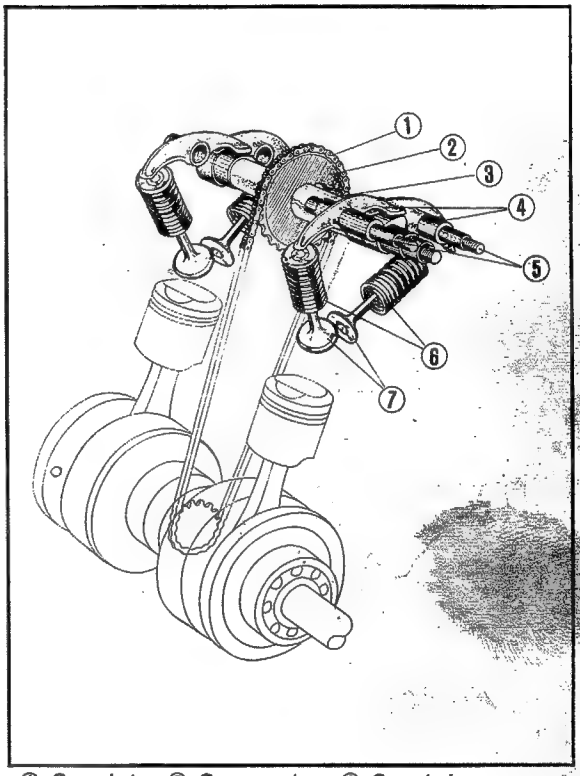


Fig. 3-12. Squish area



① Cam chain ② Cam sprocket ③ Cam shaft
④ Valve rocker arm ⑤ Rocker arm pin ⑥ Valve spring
⑦ Valve

Fig. 3-13. Valve mechanism

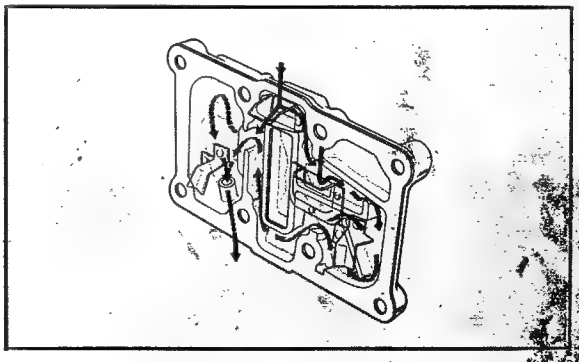
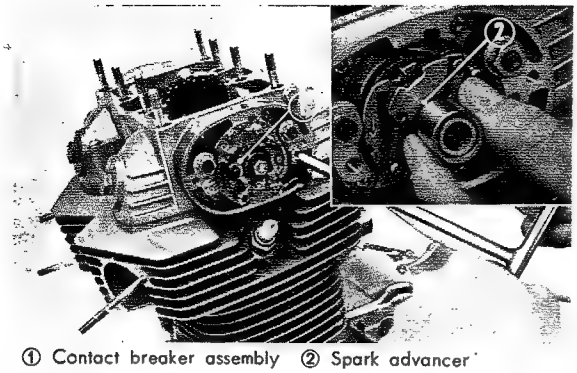
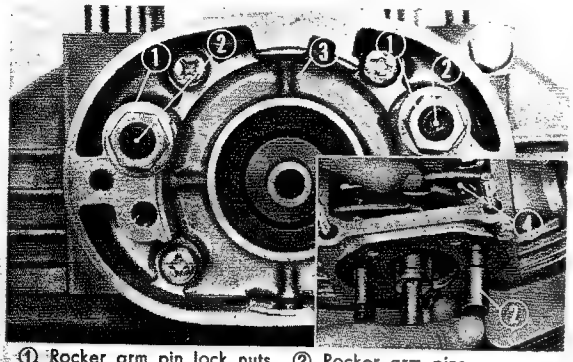


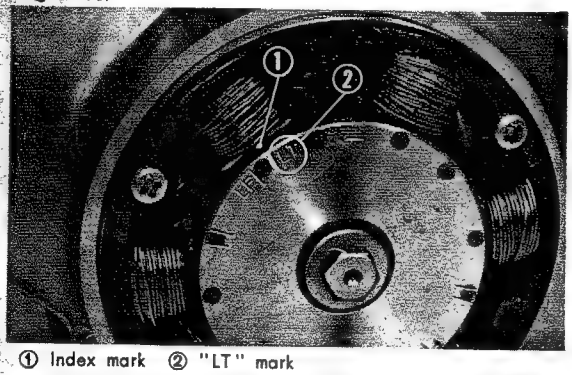
Fig. 3-14. Breather



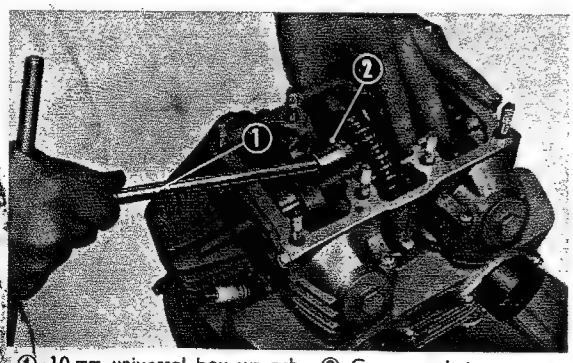
① Contact breaker assembly ② Spark advancer
Fig. 3–15. Removing the contact breaker and spark advancer



① Rocker arm pin lock nuts ② Rocker arm pins
③ Side cover ④ Rocker arm
Fig. 3–16.



① Index mark ② "LT" mark
Fig. 3–17A. Line up "LT" mark to the index mark



① 10 mm universal box wrench ② Cam sprocket
Fig. 3–17B. Removing the cam sprocket

B. Disassembly

1. Remove eight 8 mm cap nuts and remove the cylinder head cover.
2. Remove the dynamo cover, breaker point cover, contact breaker point assembly, and the spark advancer. (Fig. 3–15)
3. Remove the rocker arm pin lock nuts (both sides, 2 each), and the side covers and rocker arm pins. (Fig. 3–16)
4. Remove the cam chain tensioner.
5. Align the stator index mark to the "LT" on the A.C. generator rotor (top dead center of the exhaust stroke) to approximately 10° ATDC and then remove the sprocket alignment bolt, followed by turning the rotor to align with a point approximately 10° ATDC of the compression stroke and then remove the remaining sprocket setting bolt. (Fig. 3–17A, B)

NOTE :

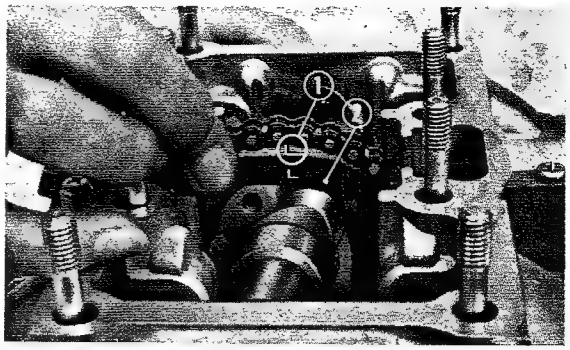
- Hook bolt and the sprocket setting bolts can be easily removed by using the 10 mm universal box wrench provided in the special tool kit. (Fig. 3–17B)
  Tool No. 07093–28601
- This is a special bolt and therefore it should not be lost or misplaced. It can be identified by the marking "9" stampes on the bolt head.

6. When removing the camshaft from the cam case, remove the camshaft from the windows for removing the cam sprocket and cam case, which are essentially provided to remove the camshaft, toward the right hand side while placing the "L" mark of cam sprocket on the upper side as for Fig. 3–18.

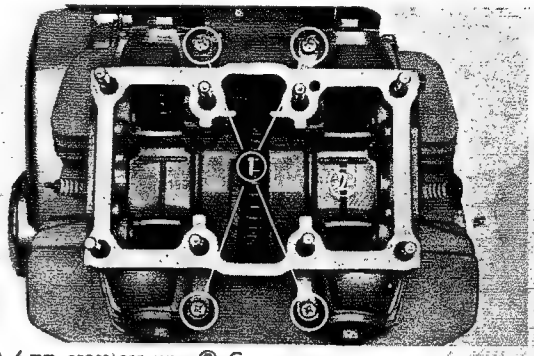
7. Remove the four 6 mm cross screws and separate the cam case. (Fig. 3–19)
8. Remove the spark plug and unscrew the 6 mm bolts from both sides. (Fig. 3–20)
9. Separate the cylinder head from the cylinder.

NOTE :

It is recommended that the nuts be loosened in the reverse order of the tightening sequence.



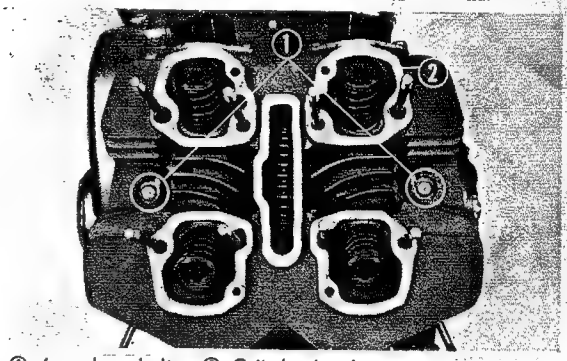
① "L" mark ② Cam sprocket
Fig. 3–18. Placing the "L" mark on the upper side



① 6 mm cross screws ② Cam case
Fig. 3–19. Removing the cam case

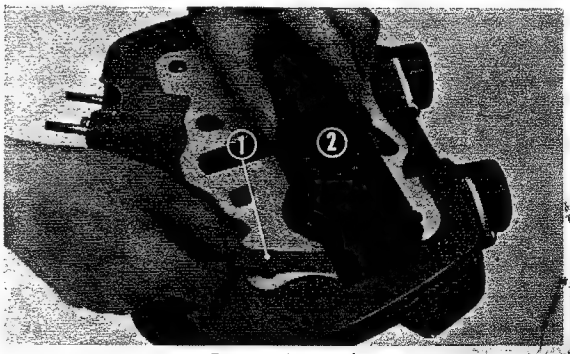
C. Inspection

1. Inspect gasket surfaces for evidence of blow-by or distortion. If surfaces are warped by more than 0.05mm (0 002in) correct by lapping on a surface plate. (Refer to Fig. 3–21A)

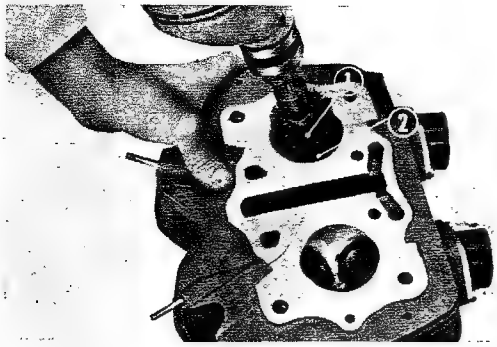


① 6 mm hex. bolts ② Cylinder head
Fig. 3–20. Removing the cylinder head

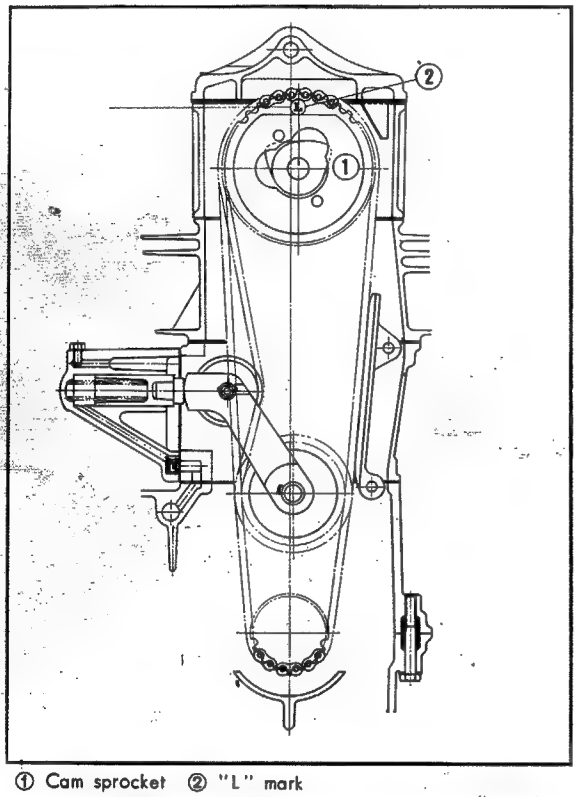
2. Remove the carbon from the combustion chamber with a carbon removal brush, being careful not to scratch or damage the chamber surface. Wash off the carbon. (Fig. 3–21B)



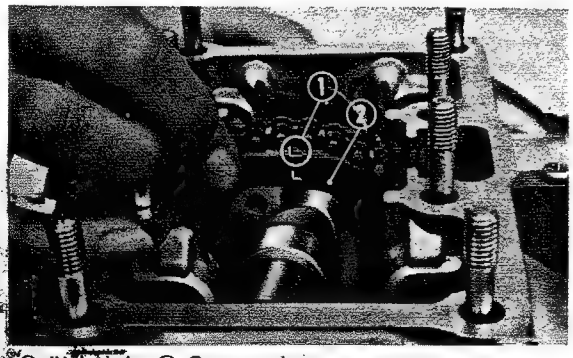
① Thickness gauge ② Stretch
Fig. 3–21A. Warpage of gasket surface



① Wire brush ② Combustion chamber
Fig. 3-21B. Removing the carbon



① Cam sprocket ② "L" mark
Fig. 3-22. Valve timing



① "L" mark ② Cam sprocket
Fig. 3-23. Placing the "L" mark on the upper side

D. Reassembly

1. Do not forget to install the cylinder gasket two guide pins.
2. After assemblying the component parts into the cylinder head, mount the head to the cylinder with two 6 mm bolts and torque to85–100 kg-cm (6.15–7.23 lb-ft).
3. Mount the cam case on the cylinder head with four 6 mm cross screws and torque to 60 to 75 kg-cm (4.34–5.42 lb-ft).
4. Raise the cam sprocket as shown in Fig. 3-23 and insert the camshaft by working it back and forth. Refer to the section 5, valve timing.

5 Valve timing

1) Align the "LT" marking on the rotor to the index mark on the stator. The left cylinder will be on top-dead-center. (Fig. 3-22)

2) Align the cutout of the cam sprocket rubber damper to the cam case mating surface by raising. (Fig. 3-23)

3) When assemblying the cam sprocket on the camshaft, slightly raise the governor alignment pin on the camshaft from the right side and make the assembly. (Fig. 3-24)

6. Mount the cam sprocket on the camshaft with two 6 mm bolts.

NOTE :

The bolts used are of different types, setting dowel bolt and setting bolt, do not reverse their installation. (Fig. 3–25)

7. Install the rocker arm on the cylinder head with the rocker arm pin, on both sides.
8. Install the side covers on both sides.
9. Assemble the spark advancer assembly, contact breaker assembly, and the point cover on the left side.
10. Install the cylinder head cover with the eight 8 mm cap nuts and torque the nuts uniformly.

NOTE :

- Torque the cylinder head starting from the inside and working out in the diagonal sequence. Use a torque wrench and torque to 180 kg-cm (13.02 lbs-ft). (Fig. 3–26)
- The two holes on the cylinder head inlet side are oil holes, therefore, all the nuts must be properly torqued to prevent oil leaks.

11. Install the cam chain tensioner on the cylinder head.

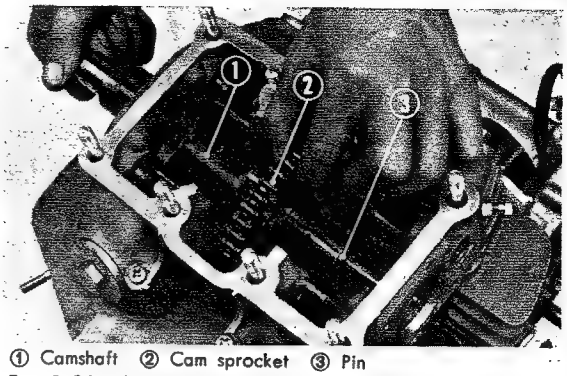
E. Camshaft Construction

In a four stroke cycle engine the camshaft makes one revolution for every two revolutions of the crankshaft.

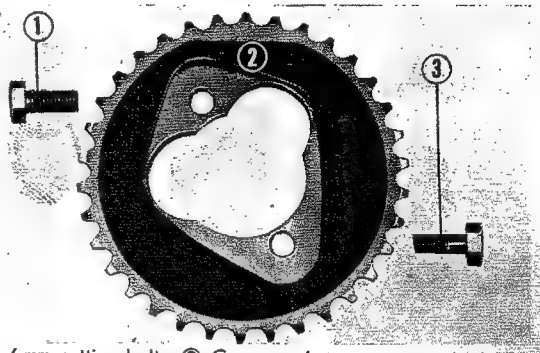
The single camshaft in this engine is driven from the crankshaft sprocket through a cam chain (incorporating a cam chain damper to reduce noise and wear.) (Fig. 3–27)

A tachometer cable drive gear is integrated on the right side of the camshaft, the spark advancer shaft attaching thread is mounted on the left side.

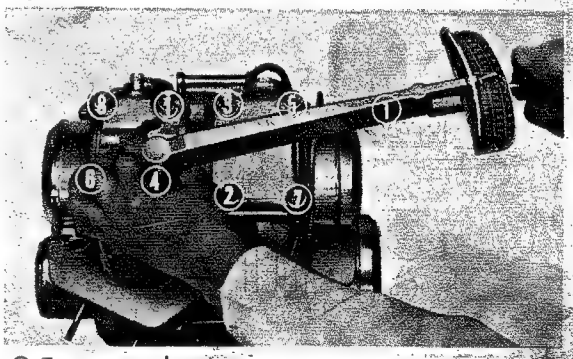
The pressurized oil which feeds both inlet sides from two locations, flows up through the cylinder studs and lubricates the bearings on both sides of the camshaft. Furthermore, the cam surfaces are lubricated by the oil thrown from the cam sprocket to prevent wear to the cam surfaces. (Fig. 3–28)



① Camshaft ② Cam sprocket ③ Pin
Fig. 3–24. Assembling the camshaft



① 6 mm setting bolt ② Cam sprocket
③ 6 mm setting dowel bolt
Fig. 3–25.



① Torque wrench
Fig. 3–26. Tightening sequence

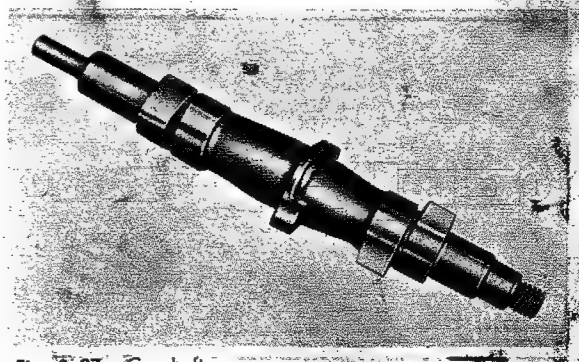
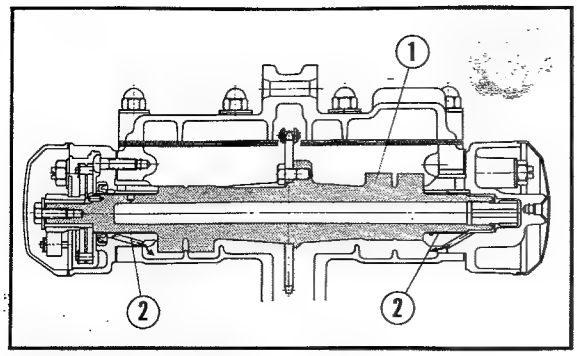
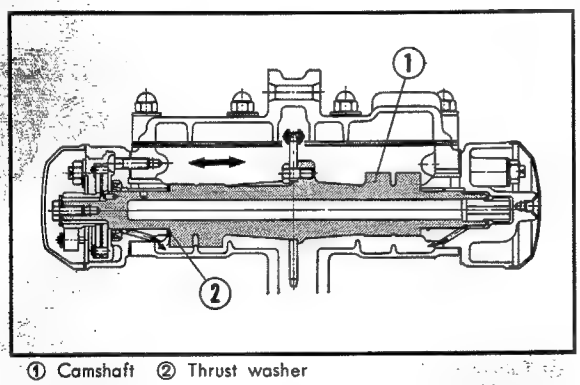


Fig. 3–27. Camshaft

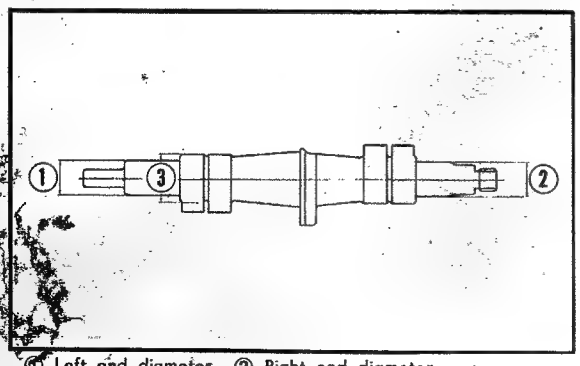


① Camshaft ② Camshaft bearing
Fig. 3-28. Camshaft bearing lubrication

① Rocker arm pin ② Rocker arm
Fig. 3-29.



① Camshaft ② Thrust washer
Fig. 3-30. Camshaft side clearance



① Left end diameter ② Right end diameter
③ Cam base circle
Fig. 3-31. Dimensions of camshaft

F. Rocker Arm and Rocker Arm Pin

The functions of the rocker arm is to rotate the camshaft and perform the opening and closing operation of the valves. The rocker arm which is supported by the rocker arm pin is made of chrome molybdenum steel with the cam shaft and valve contact surfaces, having a welded face of special hard surfacing to provide wear resistant. (Fig. 3-29)

G. Rocker Arm and Rocker Arm Pin Disassembly

Refer to the section on Cylinder Head Disassembly, paragraph 1-3.

H. Inspection

1. Camshaft

The end clearance of the camshaft is 0.3 mm (0.012 in). If the clearance is excessively large, noise will develop between 5000~6000 rpm. When such condition develop, install a 0.2 mm (0.008 in) shim which are available. (Fig. 3-30)

2. Dimensional measurement (Fig. 3-31)

Item		Standard Value	Serviceable Limit
End dia. (right & left)		21.939~21.960mm (0.864~0.865 in)	Replace if under 21.919mm (0.863 in)
Base circle		29.98~30.02mm (1.180~1.182 in)	
Cam lift	IN	6.876mm (0.271 in)	
	EX	6.869mm (0.270 in)	

3. Rocker arm

Item	Standard Value	Serviceable Limit
Inner dia.	13.0~13.027mm (0.512~0.513 in)	Replace if over 13.1mm (0.516 in)

4. Rocker arm pin

Item	Standard Value	Serviceable Limit
Outer dia.	12.95~12.968mm (0.510~0.511 in)	Replace if under 12.9mm (0.508 in)
Clearance between rocker arm & pin	0.032~0.077mm (0.0013~0.003 in)	0.115mm (0.0045 in)

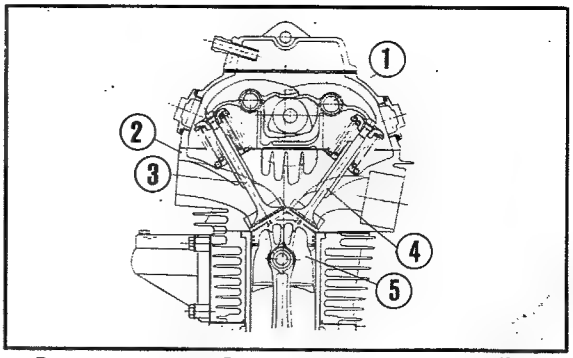
I. Rocker Arm and Rocker Arm Pin Reassembly

Perform the assembly in accordance with the procedures in section paragraph 7-11, Cylinder Head Assembly. (Fig. 3-32, 33)

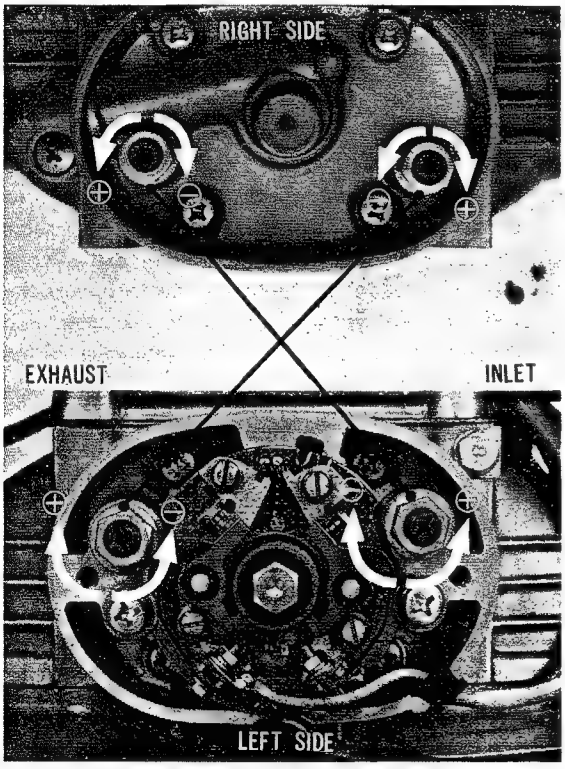
Install the rocker arm pin in the direction as shown in Fig. 3–33.

J. Valve and Valve Spring Construction

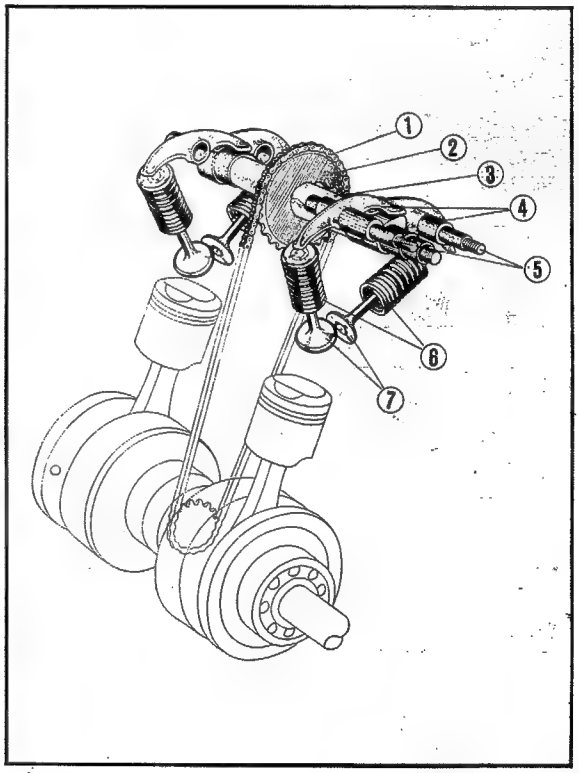
The valve and valve springs are assembled into the cylinder head. They are few of the primary components which affects the performance of the engine. The inlet valve compared to the exhaust valve is 6 mm larger in head diameter. This greatly increases the volumetric efficiency of the cylinder. The valve stem clearance for the exhaust valve is much larger than the inlet valve, this is to allow for the greater heat expansion of the exhaust valve. The valve springs are designed with a dual pitch for both the inlet and exhaust valves to prevent the valves from the floating during high speed and permitting stable engine operation in the high speed range. (Fig. 3–34)



① Rocker arm pin ② Cam case ③ Inlet valve
④ Exhaust valve
Fig. 3–32.



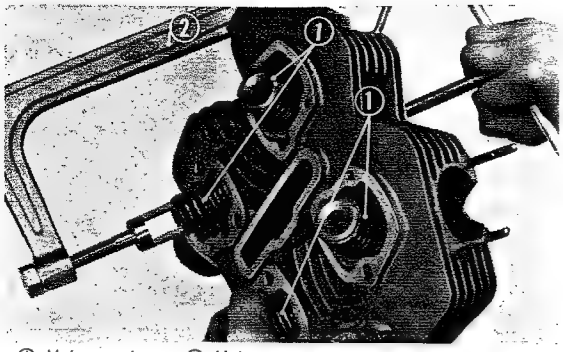
⊕ Increase
⊖ Decrease
Fig. 3–33. Tapper clearance



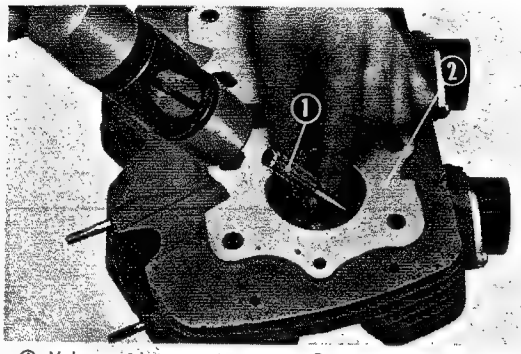
① Cam chain ② Cam sprocket ③ Cam shaft
④ Valve rocker arm ⑤ Rocker arm pin ⑥ Valve spring
⑦ Valve
Fig. 3–34. Valve mechanism

K. Valve and Valve Spring Disassembly

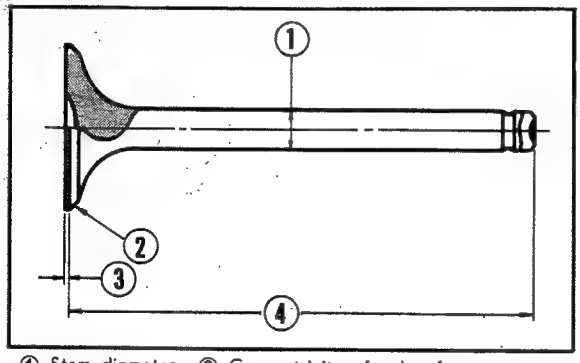
1. Disassemble the cylinder head in accordance with the section B.
2. Use the valve spring tool (Tool No. 07031–25001) and disassemble the valve cotter, valve retainer, valve spring, valves (both inlet and exhaust) and valve spring seat. (Fig. 3–35)
3. Remove the valve guide with the valve guide removing tool (Tool No. 07047–28601). (Fig. 3–36)



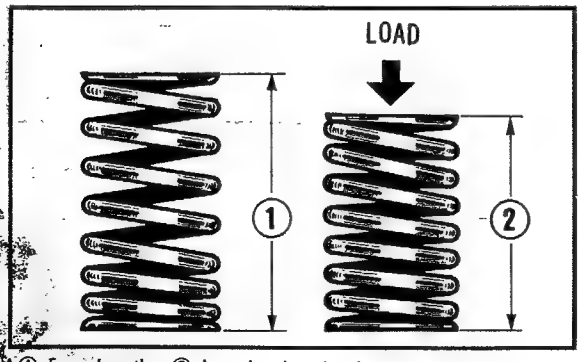
① Valve springs ② Valve assembly and disassembly tool
Fig. 3-35. Removing the valve



① Valve guide removing tool ② Cylinder head
Fig. 3-36. Removing the valve guide



① Stem diameter ② Concentricity of valve face
③ Head thickness ④ Length
Fig. 3-37. Valve



① Free length ② Length when load is applied
Fig. 3-38.

NOTE :
Properly store all parts which have been disassemble so that they will not be damaged or lost.

L. Inspection

1. Valve (Fig. 3-37)

	Item	Standard Value	Serviceable Limit
Inlet	Stem dia.	6.975~6.99mm (0.2746~0.2752 in)	Replace if under 6.955mm (0.2738 in)
	Concentricity of valve face	Within 0.03mm (0.0012 in)	
	Head thickness	0.85~1.15mm (0.033~0.045 in)	Replace if under 0.6mm (0.024 in)
	Length	98.05~98.35mm (3.86~3.872 in)	Replace if under 97.65mm (3.844 in)
Exhaust	Stem dia.	6.955~6.97mm (0.2738~0.2744 in)	Replace if under 6.935mm (0.273 in)
	Concentricity of valve face	Within 0.03mm (0.012 in)	
	Head thickness	0.85~1.15mm (0.033~0.045 in)	Replace if under 0.6mm (0.024 in)
	Length	96.63~96.93mm (3.804~3.816 in)	Replace if under 96.23mm (3.799 in)

2. Valve guide
When replacing a valve guide, use a special valve guide tool (Tool No. 07046-28601) to drive in the valve guide, being careful not to cause damages and then use a reamer to ream the hole to the specified diameter. When the valve is to be replaced due to excess the wear of the valve stem, it is recommended that the valve guide also be replaced as the valve guide will also be worn.

Item	Standard Value	Serviceable Limit
Inner dia.	7.00~7.01mm (0.2756~0.276 in)	Replace if over 7.05mm) 0.2776 in)
Outer dia.	12.56~12.57mm (0.494~0.495 in)	
Interference fit	0.042~0.07mm (0.0017~0.0028 in)	
Inlet value clearance	0.01~0.035mm (0.0004~0.0014 in)	Replace if over 0.08mm (0.0031 in)
Exhaust va e clearance	0.03~0.046mm (0.0012~0.0018 in)	Replace if over 0.09mm (0.0035 in)

3. Valve spring (Fig. 3-38)

	Item	Standard Valve	Serviceable Limit
Outer spring	Free length	49.0mm (1.929 in)	Replace if under 47.8mm (1.882 in)
	Spring pressure	31mm/62.6~72.0 kg (1.221 in/(38.03~158.76 lb)	
Inner spring	Free length	39.8 mm (1.567 in)	Replace if under 39.3mm (1.547 in)
	Spring pressure	26mm (30.5~35.1 kg (1.024 in/67.25~77.4 lb)	

4. Valve seat width

Inspect the width of the valve seat by applying a thin coating of bluing or red lead on the valve face and after inserting the valve in the guide, turn the valve while firmly holding is against the seat. The impression left on the valve seat will indicate the seat width and also the condition of the seat. (Fig. 3–39)

5. Valve seat

The valve seat is repaired with three types of cutter : valve seat surface cutter, valve seat interior cutter and valve seat 90° cutter.

The relative location and the width of the valve seat contact area is accomplished with the valve seat surface cutter, and valve seat interior cutter while the refacing of the valve contact area is preformed by the valve seat 90° cutter. (Fig. 3–40A)

For lapping the valve with the valve seat, use a sucker (a suction cup lapping tool).

After applied a small amount of fine lapping compound on the valve seat face, lap the valves while holding the sucker with both hands, and apply a slight pressure by tapping while rotating to the right and left.

a. The valve seat contact width in good condition is about 1 mm (0.04 in) and which contact width should be even on the entire contact surface.

b. The lapping compound should be washed off thoroughly with cleaning solution after lapping operation.

c. After the valve is set in, pour a small amount of engine oil into the combustion chamber and blast air in from the inlet and exhaust ports. If no bubble appeared on the valve seat area, it is an indidation that the valves are well seated. (Fig. 3–38B)

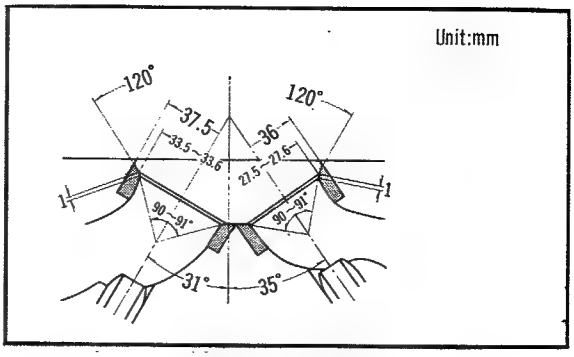
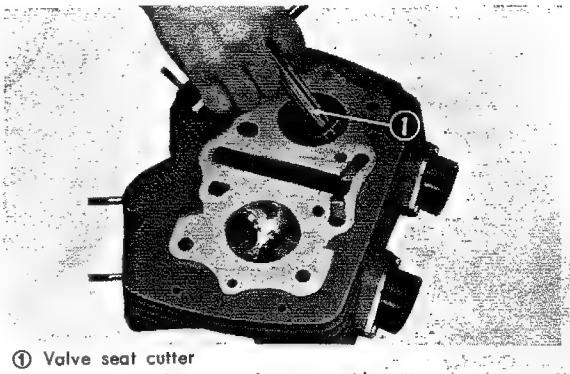
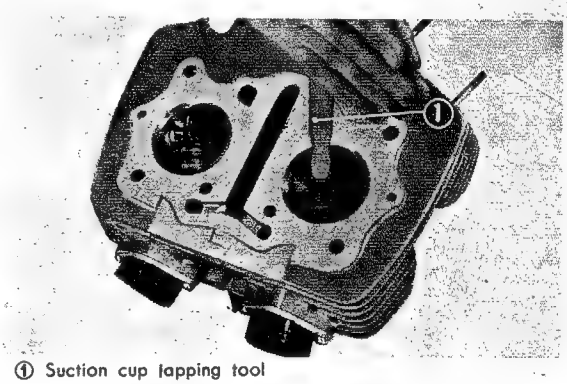


Fig. 3–39. Sectional view of valve seat



① Valve seat cutter

Fig. 3–40A. Performing valve seat with cutter



① Suction cup lapping tool

Fig. 3–40B. Performing valve seat lapping

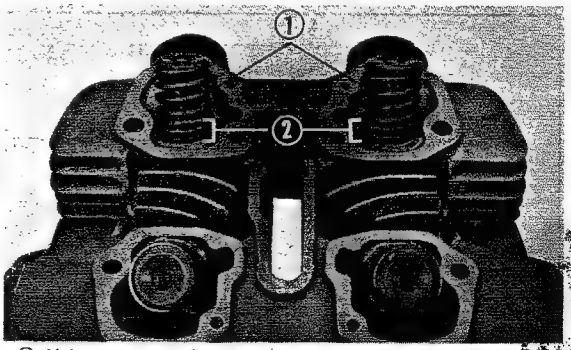
M. Valve and Valve Spring Reassembly

1. Assemble the valve, valve spring seat, and valve spring retainer into the cylinder head and assemble valve with the valve cotter by using the valve assembly tool (Tool No. 07031 –25001).

NOTE :

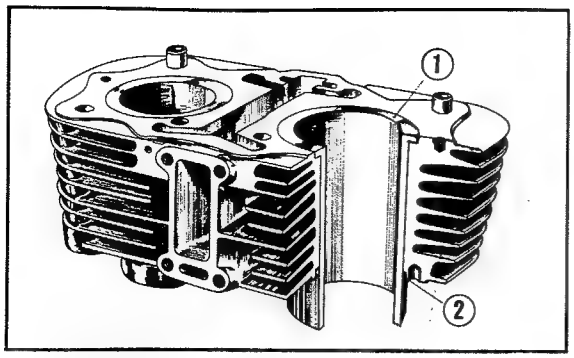
The valve spring has a dual pitch ; make sure that the end with the smaller pitch is installed toward the seat (Fig. 3–41)

2 Assemble the cylinder head in accordance with section 3.2 D.

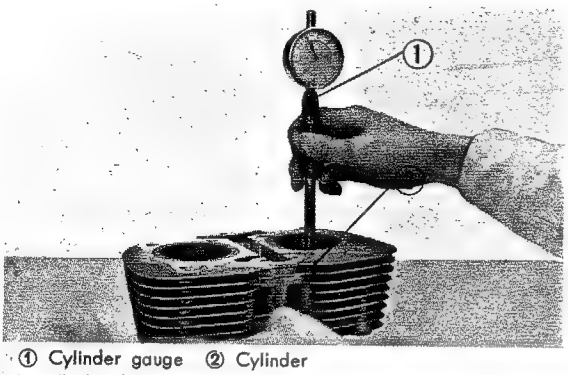


① Valve springs ② Smaller pitch

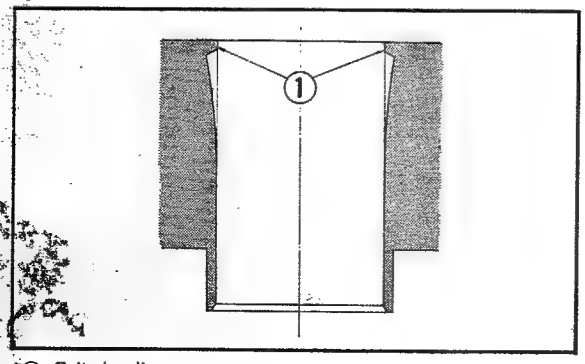
Fig. 3–41.



① Cylinder sleeve ② O-ring
Fig. 3-42. Cross-section of cylinder



① Cylinder gauge ② Cylinder
Fig. 3-43. Measuring the inner diameter



① Cylinder lip
Fig. 3-44.

N. Cylinder Construction

The cylinder sleeve is made of special steel alloy and is press fitted into the cast aluminum body. A compartment is provided between the cylinder barrels to accomodate the cam chain and tensioner. There are two cylinder studs which are hollow and serves as an oil passageway. An O-ring is installed on the sleeve skirt to prevent gas leaks. (Fig. 3-42)

O. Cylinder Disassembly

1. Remove the cylinder head in accordance with Section 3.2 B.
2. Remove the cylinder.

P. Cylinder Inspection

Measure the cylinder bore, taper and out-of-round with a precision cylinder gauge. Take measurements at the top, middle and bottom in both diametrical axes. (Fig. 3-43)

CB/CL 250

Item	Standard Value	Serviceable Limit
Bore	56.01~06.02 mm (2.205~2.206 in.)	Replace if over 56.11 mm (2.209 in)
Taper	0.005 mm (0.0002 in)	Replace if over 0.05 mm (0.002 in)
Out of round	0.005 mm (0.0002 in)	Replace if over 0.05 mm (0.002 in)

CB/CL 350

Item	Standard Value	Serviceable Limit
Bore	64.01~64.02 mm (2.5201~2.5205 in.)	Replace if over 64.11 mm (2.524 in)
Taper	0.005 mm (0.0002 in)	Replace if over 0.05 mm (0.002 in)
Out of round	0.005 mm (0.0002 in)	Replace if over 0.05 mm (0.002 in)

NOTE:

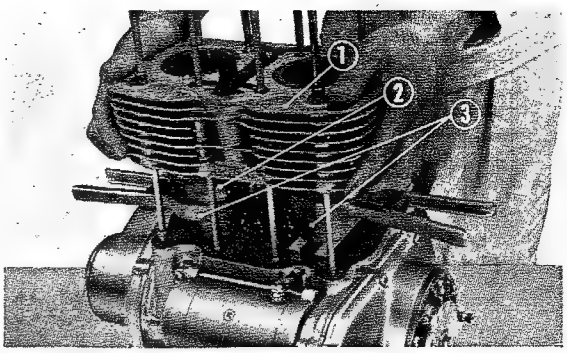
- After reboring the cylinder, finish honing must be performed to provide 1S~1.5S surface finish. The permissable stock removal during the honing operation is approximately 0.01 mm (0.0004 in). The cylinder sleeves are available in oversize up to 1 mm (0.040 in) in 0.25 mm (0.010 in) oversizes increments. Cylinders requiring reboring beyond 1.0 mm (0.040 in) should be replaced with a new cylinder sleeve.
- When only the piston is to be relaced without the cylinder, the cylinder ridge should be removed with a ridge reamer. (Fig. 3-44)

Q. Cylinder Reassembly

1. Check to make sure that the cylinder gasket and the two locating pins on the crankcase are installed in place; also check to make sure that the O-ring and cam chain guide are installed on the cylinder skirt.
2. Assemble the cylinder by using a piston ring compressor. (Fig. 3-45)
3. Assemble the cylinder head in the sequence of 3.2 D.

NOTE:

When installing the cylinder, check to make sure that the piston ring gaps are spaced equally a part. This is to prevent gas blow-by.



① Cylinder ② Piston ③ Piston ring compressor
Fig. 3-45. Installing the cylinder

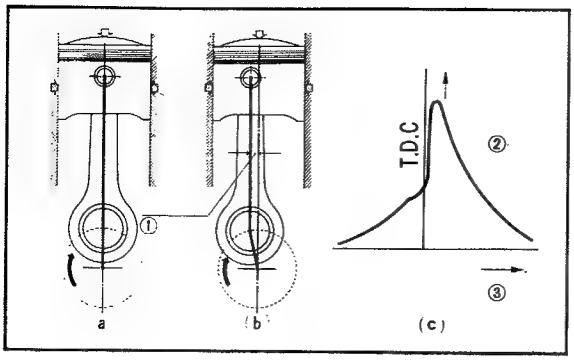
R. Piston Description

The piston is made from selected aluminum alloy casting, material, SAE 332. This material is light and strong, making it suitable for high speed. In addition, it possess good heat conducting property to rapidly dissipate heat. Furthermore, the coefficient of heat expansion is small thus minimizing the warpage at elevated temperature and permitting a small piston to cylinder clearance design. The piston, compared to the skirt, is exposed to higher temperature and since the expansion is greater, it is tapered smaller toward the top. The tapering of the piston also tends to lessen the piston slap when the throttle is lightly snapped without load on the engine. (Fig. 3-46)

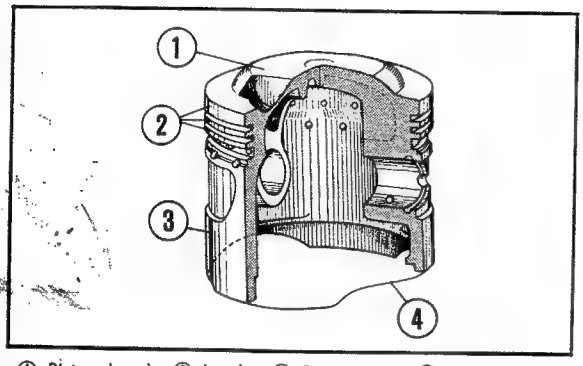
Fig. 3-46. Piston

The piston employs a four step taper, further the piston pin boss area is made thicker, resulting in greater expansion at high temperature. For this reason, the diameter of the piston skirt is made smaller in the direction of the piston pin so that at the high operating temperature, the piston will expand into a true circular shape. The skirt is constantly provided with flexibility to assure that no deformation will result even from extended continuous driving.

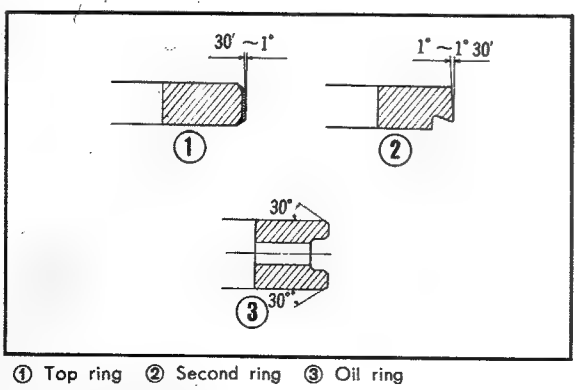
The piston pin is offset 1 mm (0.04 in) from the piston centerline in the direction of the inlet valve so that when the piston approaches the top-dead-center of the compression stroke, the side load from the cylinder moves from the right side to the left. With a "O" offset, the point will move to align with the top-dead-center of



① Offset ② Pressure ③ Crank angle
Fig. 3-47. Offset



① Piston head ② Lands ③ Piston skirt ④ Slipper
Fig. 3-48.



① Top ring ② Second ring ③ Oil ring
Fig. 3-49. Sectional view of piston rings

the compression stroke. As shown in Fig. 3.47, the point of maximum combustion pressure occurs after the top-dead-center, therefore, the purpose of the offset is to move the point toward the point of weaker pressure, which, is before top-dead-center, by so doing, the piston can escape the high pressure and makes it possible to eliminate the piston slap.

Piston is made with a dome head to give it extremely high strength. Further, this will enable higher compression ratio and limit overheating of the piston. The skirt of the piston is designed slippered on the side where no side load is applied. This is to reduce weight and also to minimize the frictional area. (Fig. 3-48)

Piston pin is of a floating type and is set in place by ring clips.

S. Piston Ring Construction

The piston rings performs a vital function of forming a seal between the piston and cylinder; controlling the lubrication of the cylinder wall and dissipating the heat of the piston produced by the combustion. The condition of the piston will have considerable effect on the power developed by the engine.

Rings are made of special cast iron for greater strength, wear and heat resistance, and possesses good heat conducting qualities. Further, the cylinder wall contacting surface of the top and oil rings are given a hard chrome plated surface and finished by wet honing for greater wear resistance and good seating.

To prevent ring flutter, the rings are made thinner and greater in depth to increase the pressure against the cylinder wall. Further, the top and the second rings are made at a slight taper were it contacts the cylinder wall so that the wear-in time is shortened.

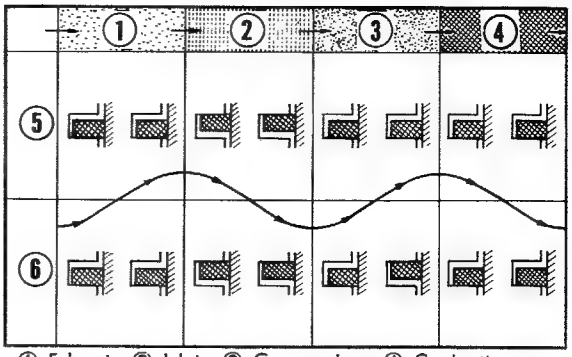
Oil ring grooves and the bottom of the second rings are scalloped to improve oil control and prevent oil entry into the combustion chamber which would result carboning up of the spark plugs, piston, rings and etc.

When assembling the rings, make certain that the ring manufacturer's mark adjacent to the ring gap is on the top and the gaps for the three rings are spaced equally apart (120°).

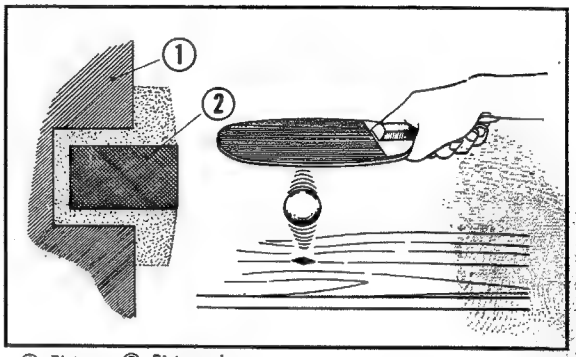
The bottom side of the piston head is provided with reinforcement ribs for added strength as well as for a better cooling effect. Oil drain holes are made just below the oil ring groove to allow the oil to flow back into the crankcase. (Fig. 3-49)

(PISTON RING FLUTTER)

At low speed, the piston ring is forced against the upper side of the ring groove only during the intake stroke. At high speed, however, the inertia of the ring overcomes the gas pressure and friction, and floats to the top of the groove immediately before the top-dead-center in the compression stroke. At this mement, combustion occurs and the ring is forced against the bottom side of the ring groove by the combustion pressure. This up and down movement during exhaust-intake-compression becomes more and more intense, coupled with the increasing inertial force. As this sequence is repeated, ultimately, the ring vibrates violently within the ring groove like a pingpong ball between the racket and the table as shown in the Fig. 3-51 and thus allow the gas to "blow-by". (Fig. 3-50, 51)



① Exhaust ② Inlet ③ Compression ④ Combustion
⑤ Low speed ⑥ High speed
Fig. 3-50. Piston ring motion



① Piston ② Piston ring
Fig. 3-51. Piston ring flutter

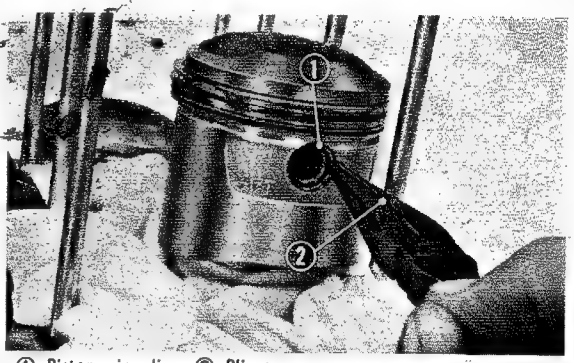
T. Piston and Piston Ring Disassembly

1. Remove the piston pin clip and push out the piston pin. Disassemble piston from the connecting rod.

NOTE :

When removing the piston pin clip, care should be exercised so that the clip is not dropped into the crankcase. (Fig. 3-52)

2. Remove the piston rings from the piston. If no tool is available, the rings may also be removed with hand by separating ring at the opening with both hands. The ring should not be twisted as it will break.



① Piston pin clip ② Pliers
Fig. 3-52. Removing the piston pin clip

U. Piston and Piston Ring Inspection

1. Before inspection, carbon adhering to the piston head or ring groove should be removed, using care not to scratch piston.

NOTE :

Emery paper should not be used for removing the carbon, use a carbon scraper.

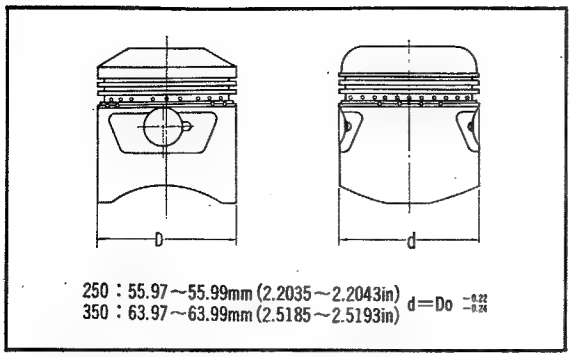
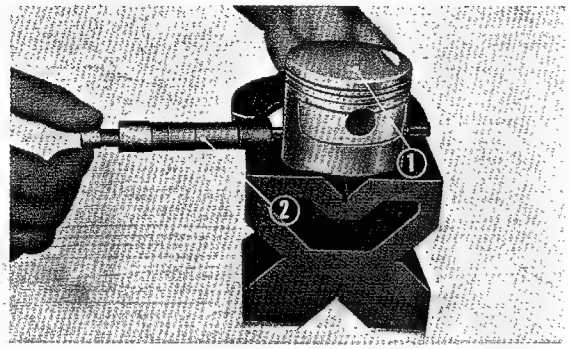
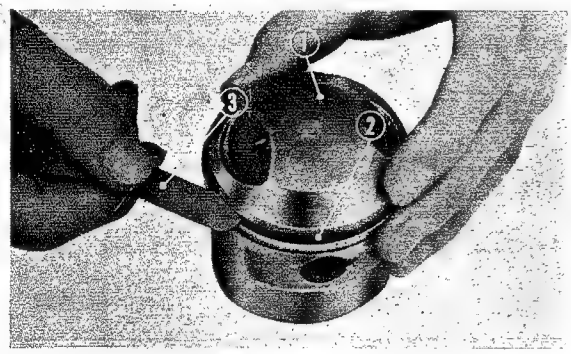


Fig. 3-53. Dimension of piston



① Piston ② Micrometer
Fig. 3-54. Measuring the piston diameter



① Piston ② Piston ring ③ Thickness gauge
Fig. 3-55. Piston groove and piston ring clearance

2. Piston diameter. (Fig. 3-53, 54)

CB/CL 250

Item	Standard Value
Outside dia. D	55.97~55.99 mm (2.2035~2.2043 in)

CB/CL 350

Item	Standard Value
Outside dia. D	63.97~63.99 mm (2.5185~2.5193 in)

NOTE :

Oversize piston are available in four difference sizes at an increment of 0.25 mm (0.0090 in).

3. Ring groove clearance
When a new piston ring is fitted. (Fig. 3-55)

CB/CL 250

Item	Standard Value	Serviceable Limit
Top	0.030~0.060 mm (0.0012~0.0024 in.)	Replace if over 0.18 mm (0.007 in)
Second	0.015~0.045 mm (0.0006~0.0018 in)	Replace if over 0.165 mm (0.0065 in)
Oil	0.010~0.045 mm (0.0004~0.0018 in)	Replace if over 0.170 mm (0.0067 in)

CB/CL 350

Item	Standard Value	Serviceable Limit
Top	0.030~0.060 mm (0.0012~0.0024 in)	Replace if over 0.180 mm (0.007 in)
Second	0.015~0.045 mm (0.0006~0.0018 in)	Replace if over 0.165 mm (0.0065 in)
Oil	0.015~0.045 mm (0.0004~0.0018 in)	Replace if over 0.170 mm (0.0067 in)

4. Piston pin diameter

CB/CL 250

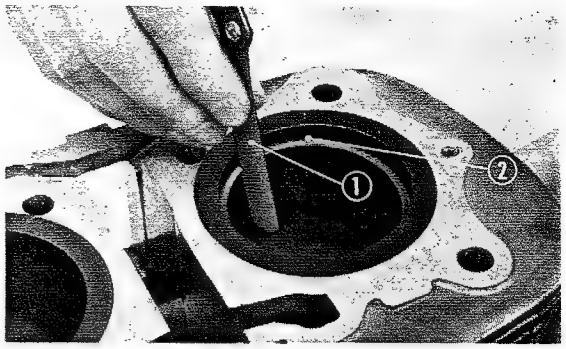
Item		Standard Value	Serviceable Limit
Piston hole	Bore	15.002~15.008 mm (0.5906~0.5909 in)	Replace if under 15.05 mm (0.593 in)
Piston pin	Outside diameter	14.994~15.00 mm (0.5900~0.5906 in)	

CB/CL 350

Item		Standard Value	Serviceable Limit
Piston hole	Bore	15.002~15.008 mm (0.5906~0.5909 in)	Replace if under 15.05 mm (0.593 in)
Piston pin	Outside diameter	14.994~15.00 mm (0.5900~0.5906 in)	

5. Piston ring and gap

Measure the ring gap by inserting the piston ring into the cylinder so that the ring is at right angle to the cylinder axis, the gap should be measured with a thickness gauge. (Fig. 3–56)



① Thickness gauge ② Piston ring

Fig. 3–56. Measuring end gap of piston ring

CB/CL 250

Item	Standard Value	Serviceable Limit
Ring end gap	0.15~0.35 mm (0.006~0.014 in)	Replace if over 0.75 mm (0.030 in)

CB/CL 350

Item	Standard Value	Serviceable Limit
Ring end gap	0.2~0.4 mm (0.008~0.016 in)	Replace if over 0.8 mm (0.032 in)

6. Ring tension

The piston ring tension is measured with a tension measuring instrument.

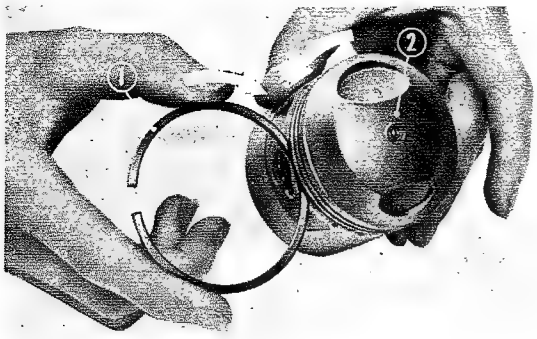
7. Ring width and thickness.

CB/CL 250

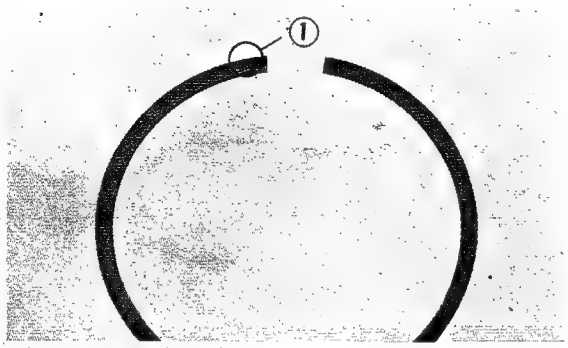
Item		Standard Value	Serviceable Limit
Ring thickness	Top	1.460~1.475 mm (0.057~0.058 in)	Replace if under 1.420 mm (0.056 in)
	Second	1.475~1.490 mm (0.058~0.059 in)	Replace if under 1.435 mm (0.0564 in)
	Oil	2.475~2.490 mm (0.097~0.098 in)	Replace if under 2.430 mm (0.096 in)
Ring closing force	Top	0.74~1.12 kg (1.632~2.470 lbs)	Replace if under 0.064 kg (1.41 lbs)
	Second	0.62~0.98 kg (1.367~2.161 lbs)	Replace if under 0.52 kg (1.147 lbs)
	Oil	0.8~1.2 kg (1.764~2.646 lbs)	Replace if under 0.61 kg (1.345 lbs)

CB/CL 350

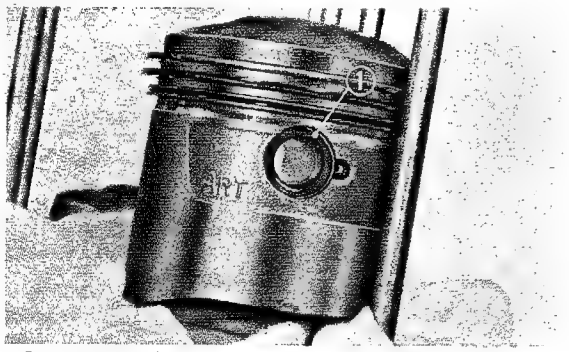
Item		Standard Value	Serviceable Limit
Ring thickness	Top	1.460~1.475 mm (0.057~0.058 in)	Replace if under 1.420 mm (0.056 in)
	Second	1.475~1.490 mm (0.058~0.059 in)	Replace if under 1.435 mm (0.0564 in)
	Oil	2.475~2.490 mm (0.097~0.098 in)	Replace if under 2.430 mm (0.096 in)
Ring closing force	Top	0.69~1.06 kg (1.521~2.337 lbs)	Replace if under 0.59 kg (1.301 lbs)
	Second	0.71~1.09 kg (1.566~2.403 lbs)	Replace if under 0.61 kg (1.345 lbs)
	Oil	0.86~1.28 kg (1.896~2.822 lbs)	Replace if under 0.67 kg (1.477 lbs)



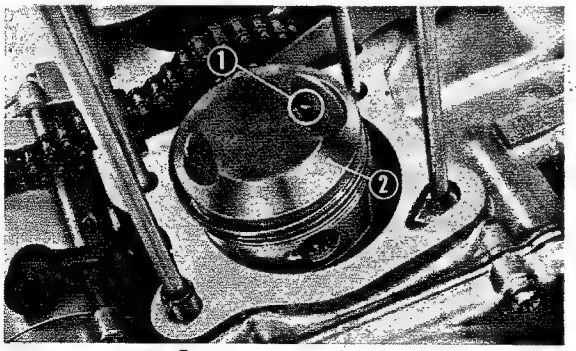
① Piston ring ② Piston
Fig. 3-57. Rolling the piston ring in the piston groove



① Manufacturer's mark
Fig. 3-58. Manufacturer's mark



① Piston pin clip
Fig. 3-59. Setting the piston pin clip



① Arrow mark ② Piston
Fig. 3-60. Assembling the piston

V. Piston and Piston Ring Reassembly

1. Install the piston rings on the piston in the reverse order of disassembly. The bottom oil ring must be installed first.

NOTE :

- When new piston ring is installed, a check should be made to assure that the ring fits freely in the groove. This can be done by rolling the piston ring externally in the piston groove. (Fig. 3-57)
- The rings must not be installed upside down; this will cause oil pumping. The top side of the ring is etched at the opening with the initial of the manufacture's name. (Fig. 3-58)
- Use of the piston ring setting tool will facilitate installation and prevent possibility of ring breakage.

2. Assemble the piston to the small end of the connecting rod. Only a slight hand pressure should be required to insert the piston pin. Always install a new piston pin clip.

NOTE :

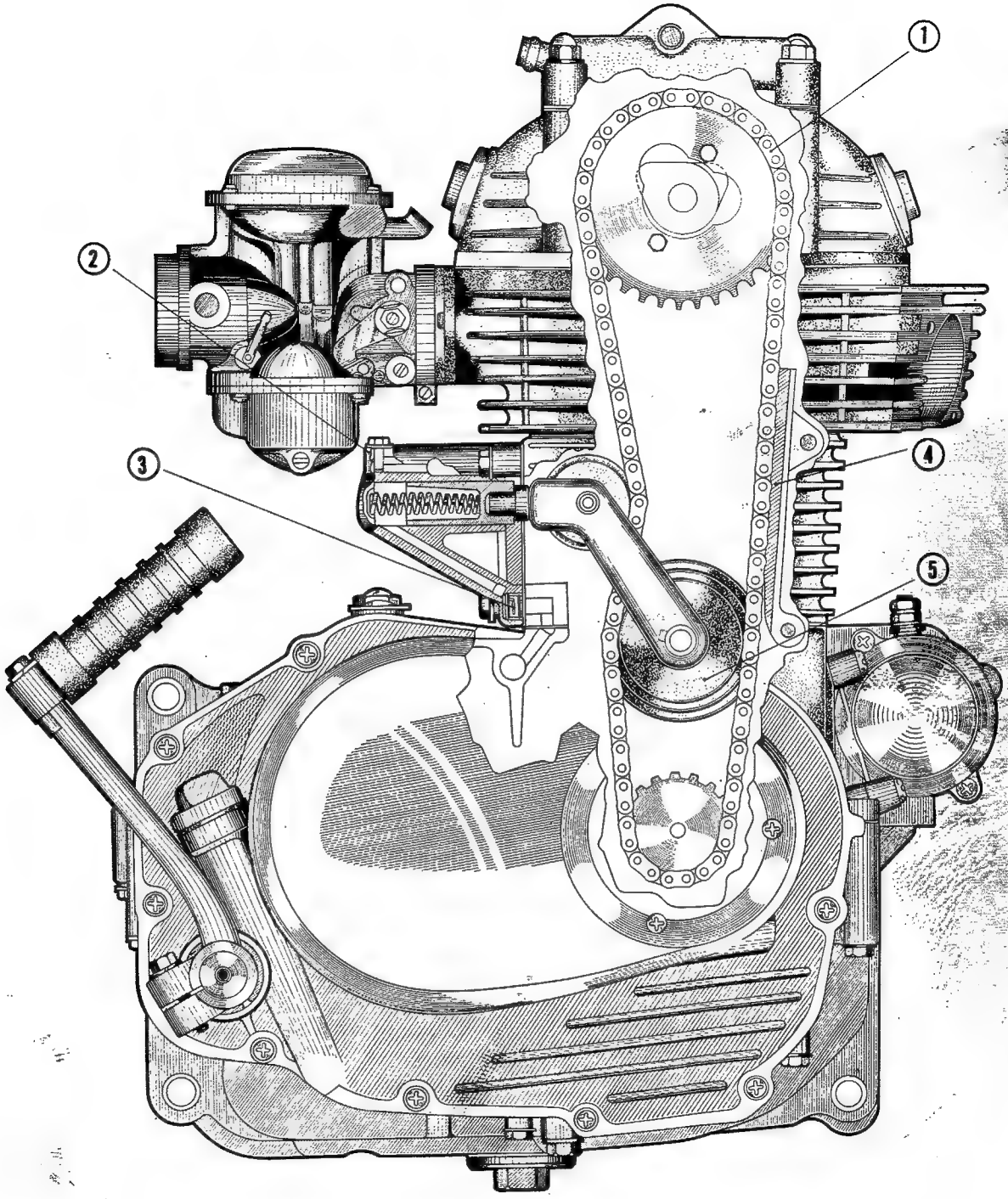
- Cover the crankcase with a rag to prevent possibility of the pin clip from dropping into the crankcase.
- Set the clip so that the opening is away from the groove cutout. (Fig. 3-59)
- The piston must be assembled so that the Arrow marking stamped on the piston head is toward the top when the engine is in the normal attitude. (Fig. 3-60)

3. Assemble the cam chain guide to the cylinder.
4. Install the cylinder.

NOTE :

- The ring gap of the three piston rings should be staggered 120° apart.
- Use of the piston ring compressor tool for installing the cylinder will prevent brakage of the piston ring and, further, it will simplify the work.

5. Install the cylinder head in accordance with Section 3.2 D.



① Cam chain ② Cam chain tensioner ③ Check valve ④ Cam chain guide ⑤ Cam chain guide roller

Fig. 3-61. Sectional view of cam chain

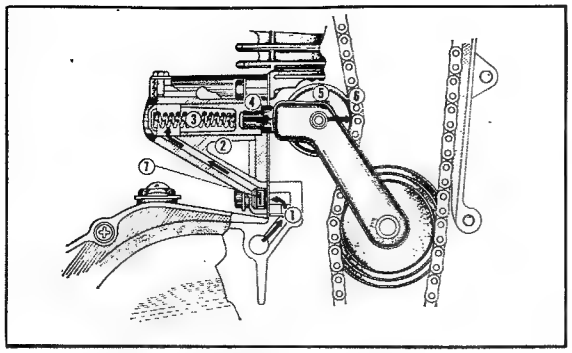
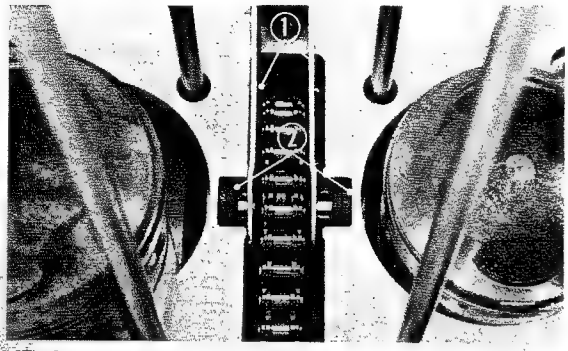
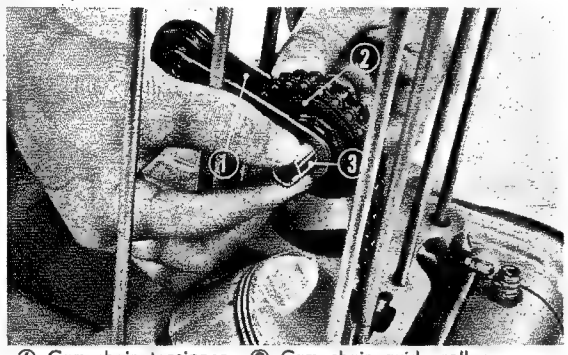


Fig. 3-62. Cam chain tensioner mechanism



① Cam chain tensioner ② Cam chain roller pin rubber
Fig. 3-63. Removing the cam chain roller pin rubber



① Cam chain tensioner ② Cam chain guide roller
③ Cam chain roller pin
Fig. 3-64. Removing the cam chain guide roller

W. Cam Chain Tensioner and Guide Roller Construction

An automatic hydraulic adjusting type cam chain tensioner is used, making it unnecessary to perform adjustment. Constant tension is applied to the cam chain by the hydraulicaly actuate cam chain roller. Further, cam chain guide roller is located between the crankcase and the cylinder mounting surface to prevent chain from dancing. Also to eliminate chain noise, automatic hydraulic adjusting hydraulic type chain tensioner is employed. The oil which has been pressurized by the oil pump passes through the orifice ① in the upper crankcase, through the lower end of the cylinder and enters the cam chain tensioner holder ②. And together with the spring ③, applies pressure against the tensioner push rod ④, and forces the tensioner roller ⑤ against the cam chain ⑥.

A check valve ⑦ is incorporated in the cam chain tensioner holder to prevent the reverse flow of the oil which has enters the holder, thereby, maintaining a constant tension against the cam chain. (Fig. 3-61, 62)

X. Tensioner and Guide Roller Disassembly

1. Perform the disassembly in accordance with section 3.2 B cylinder head Disassembly.
2. Also refer to section cylinder removal.
3. Remove the Cylinder in accordance with section 3.2 O.
4. Remove the cam chain from cam sprocket.
5. Remove the cam chain roller pin rubber which holds the cam chain tensioner from the crankcase. (Fig. 3-63)

NOTE :

When disassembling, exercise care that the small cam chain roller pin rubber does not dropped into the crankcase.

5. Remove the cam chain tensioner.

   Separate the cam chain tensioner from the case.

6. By removing the cam chain roller pin and the cam chain roller collar the cam chain guide roller can be removed from the cam chain tensioner. (Fig. 3-64)

Y. Tensioner and Guide Roller Reassembly

1. After checking all the parts for damages and distortion, perform the reassembly in the reverse order of removal.

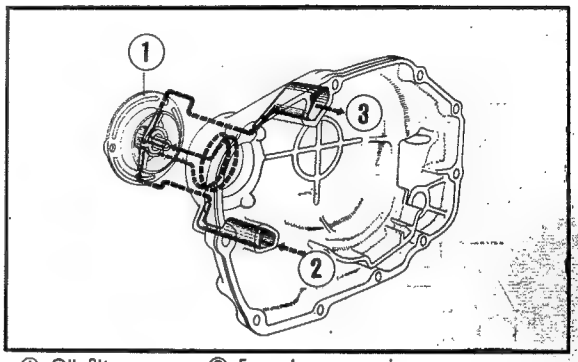
NOTE :

When installing the cam chain tensioner into the case, the cutout on the cam chain roller pin must be toward the top ; then install the roller pin rubber.

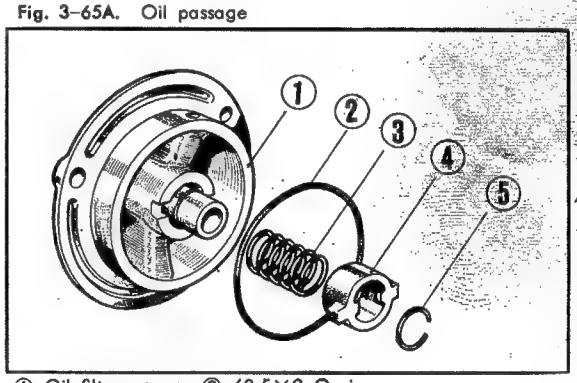
3.3 CRANKCASE COVER (RIGHT)

A. Construction

The crankcase is made up of the upper and lower halves aluminum alloy diecasting. Crankcase covers provide housing for the primary engine components. The oil filter cover is fitted to the right crankcase cover and provides the passage for lubricating oil in two direction. The oil is pressurized by the oil pump and routed to the individual sections of the engine through the right crankcase cover lower passage, oil filter cover external channel, oil filter, oil filter cover center section, right crankcase cover upper passage, and upper crankcase oil sump. (Fig. 3–65)



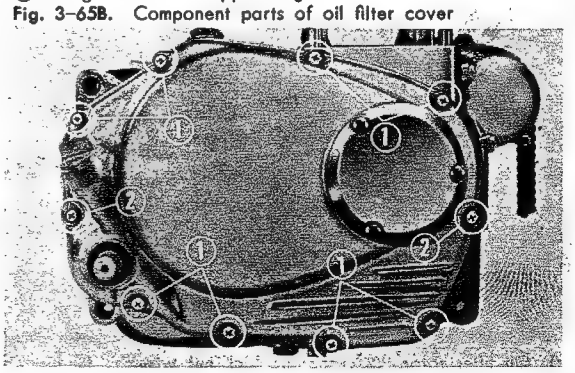
① Oil filter cover ② From lower crankcase
③ To upper crankcase
Fig. 3–65A. Oil passage



① Oil filter cover ② 63.5×2 O–ring
③ Oil guide metal spring ④ Oil guide metal
⑤ Oil guide metal stopper ring
Fig. 3–65B. Component parts of oil filter cover

B. Disassembly

1. Drain the engine oil.
2. Remove the kick starter pedal from the kick starter pinion shaft.
3. Remove the mounting screws and disassemble crankcase cover. (Fig. 3–66)



① 6×28 cross screws ② 6×36 cross screws
Fig. 3–66. Removing R. crankcase cover

C. Reassembly

1. Before reassembling the crankcase cover, inspect the crankcase and oil filter covers for cracks and also for any damages to the mating surface since they will cause leaks.
2. Inspect the oil ring and the gasket for any damages, replace if necessary.
3. The kick starter arm should be installed on the kick starter spindle by matching the punch mark on the spindle.
4. After assembly, tighten all screws uniformly to prevent the cover from warping and consequent oil leaks.

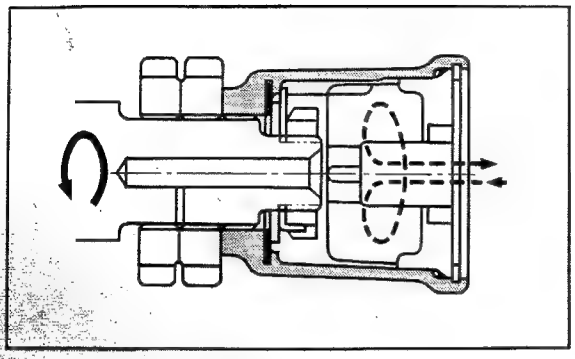


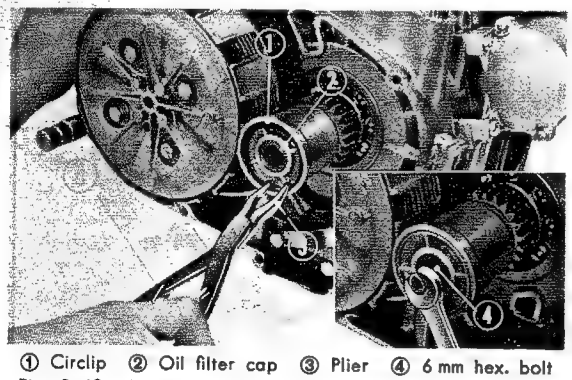
Fig. 3-67. Cross-section of oil filter

D. Oil Filter Construction

Oil which flows into the oil filter is picked up by the spinning blade on the filter cap and the foreign matter such as powder, carbon, dust, etc. are separated from the oil by centifugal force and permitting only the clean oil to pass through the center section of the filter cover. (Fig. 3-67)

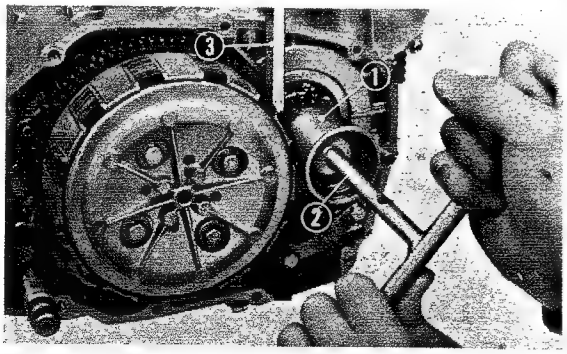
E. Oil Filter Disassembly

1. Remove the right crankcase cover in accordance with Section 3.3 B.
2. Remove the circlip and filter cap. (Fig. 3-68)



① Circlip ② Oil filter cap ③ Plier ④ 6 mm hex. bolt
Fig. 3-68. Removing the oil filter cap

3. Straighten the tongue of the spring washer pawls and remove the 16 mm lock nut by using the T-handle lock nut wrench. The filter rotor can then be removed. (Fig. 3-69)



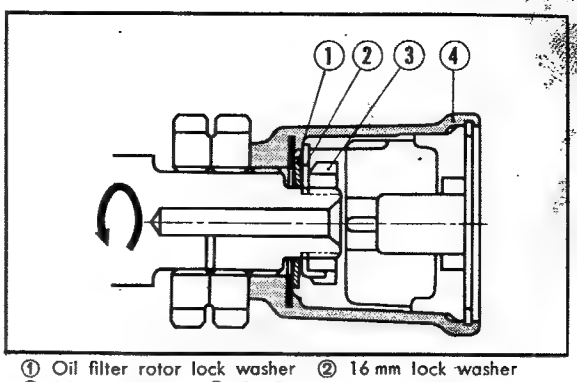
① Oil filter rotor ② T-handle lock nut wrench ③ Block
Fig. 3-69. Removing the oil filter rotor

F. Oil Filter Reassembly

1. Clean the inside of the oil filter rotor and assembly. After cleaning all of the parts, perform the reassembly in the reverse order of assembly.

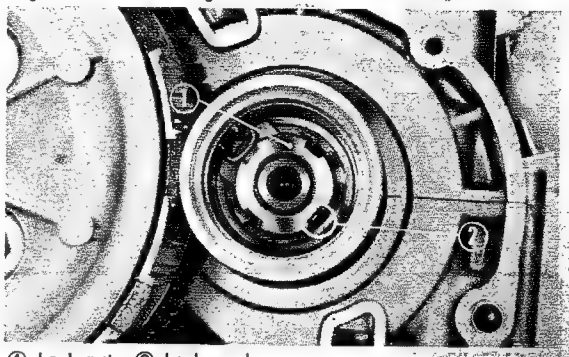
NOTE :

When assemblying the oil filter rotor on the crankshaft, assemble the oil filter rotor lock washer, 16 mm lock washer and the lock nut in that order. The oil filter rotor lock washer should be assembled with the tab toward the outside. (Fig. 3–70)



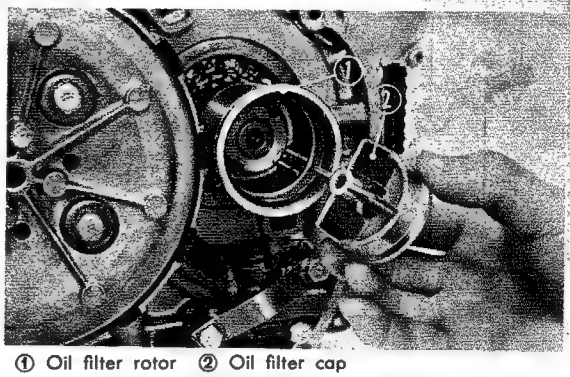
① Oil filter rotor lock washer ② 16 mm lock washer
③ 16 mm lock nut ④ Oil filter rotor
Fig. 3–70. Assembling oil filter rotor lock washer

2. Make sure that the 16 mm lock nut is properly torqued and locked to prevent loosening. (Fig. 3–71)



① Lock nut ② Lock washer
Fig. 3–71. Tightening the lock nut

3. Aligned filter cap head to the groove incorporated within the rotor wall, assemble the filter cap install and set the circlip. (Fig. 3–72)

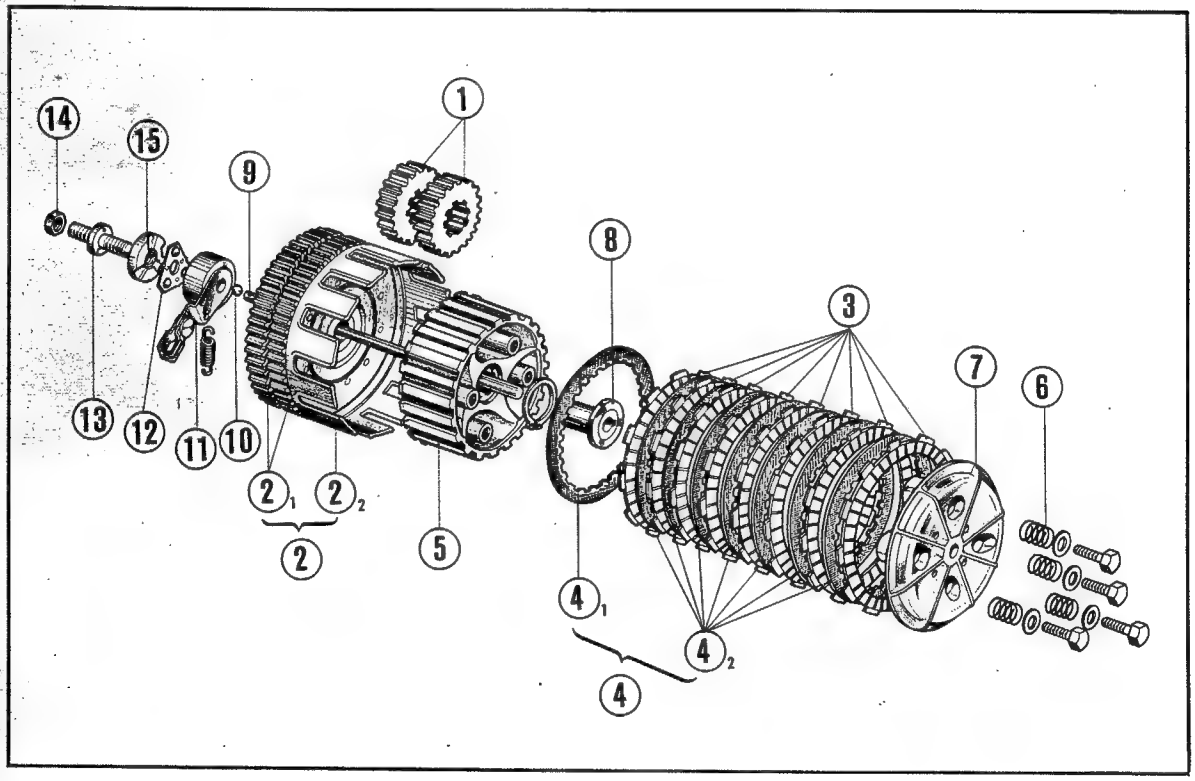


① Oil filter rotor ② Oil filter cap
Fig. 3–72. Assembling the oil filter cap

G. Clutch Construction

The function of the clutch is to transmit power from the crankshaft to the transmission main shaft by the friction between the clutch friction disc and the clutch plate. The clutch on the Honda 250/350 is a multiple disc wet type clutch with a friction disc bonded to a core having a good heat dissipating characteristic. When the clutch is engaged, the clutch center rib is locked to the clutch pressure plate ⑦ by the friction between the clutch friction disc ③ and clutch plate ④ due to the force of the clutch spring ⑥. The clutch outer ② and the clutch center ⑤ become an integral unit, transmitting the power from the crankshaft to the transmission main shaft by the way of the primary drive gear ①, clutch outer ②, clutch friction disc ③, clutch plate ④ and clutch center ⑤. (Fig. 3-73)

The clutch lifter cam will rotate in the direction of the arrow when the clutch lever is pulled. There is a inclined groove machined on the surface opposite the clutch lever on the clutch lifter cam which contains three steel balls. As the clutch lifter cam rotates, the balls move toward the shallow groove forcing the clutch lifter cam outward; the clutch lifter rod in turn is forced outward by the #10 (5/16″) steel ball. The force against the clutch lifter joint piece causes the clutch pressure plate to push the spring which results in the disengagement of the clutch plate from the clutch friction disc and disrupting the transmission of the power.



① Primary drive gear ② Clutch outer complete ②₁ Primary driven gear ②₂ Clutch outer
③ Clutch friction disc (8 ea.) ④ Clutch plate ④₁ Clutch plate A ④₂ Clutch plate B ⑤ Clutch center
⑥ Clutch spring ⑦ Clutch pressure plate ⑧ Clutch lifter joint piece ⑨ Clutch lifter rod ⑩ #10 steel ball
⑪ Clutch lever ⑫ Steel ball (clutch ball retainer) ⑬ Clutch adjuster ⑭ Clutch adjuster lock nut
⑮ Clutch adjusting cam

Fig. 3-73A.

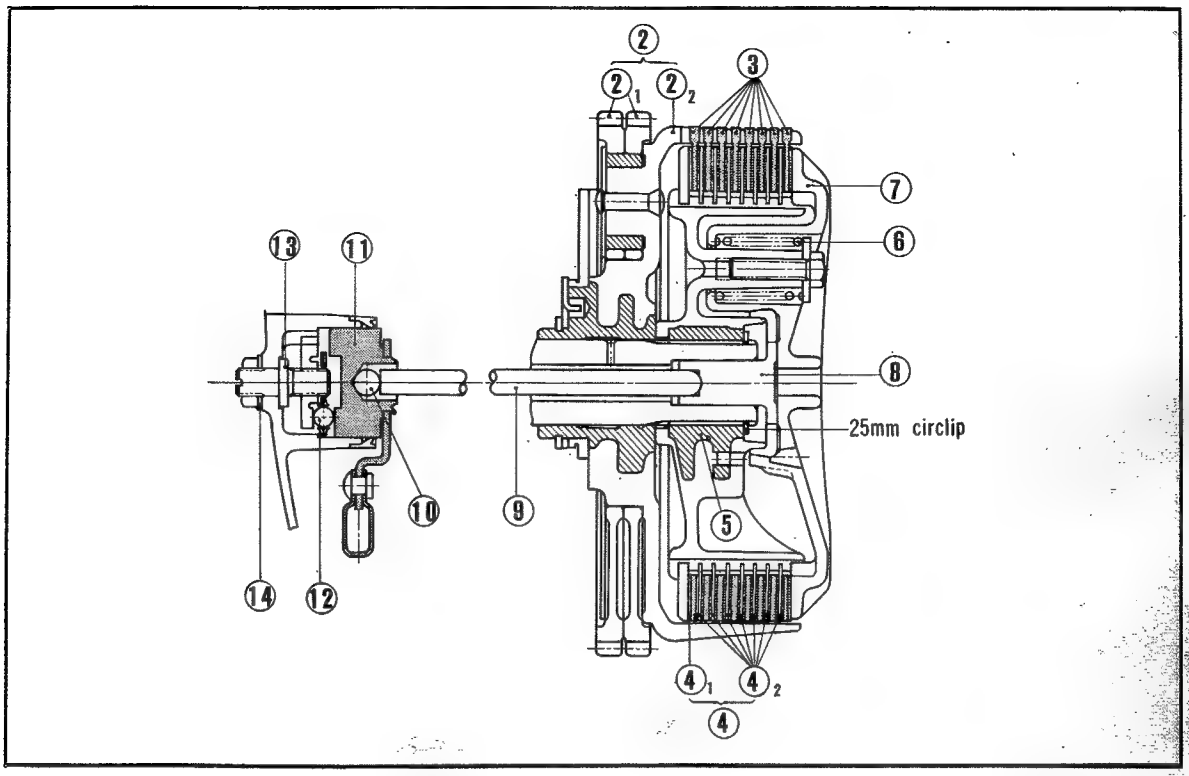


Fig. 3-73B. Sectional view of clutch

The clutch friction discs; clutch outer ② and the primary drive gear ① being integrally connected to the crankshaft, rotates freely, whereas, the clutch plates, clutch center ⑤, clutch spring, clutch pressure plate, clutch lifter piece ⑧ and clutch lifter rod remain stationay or revolve with the transmission main shaft independent of the crankshaft.

Clutch adjustment is made by loosening the clutch adjuster lock nut and turning the clutch adjuster ⑬. (Fig. 3-74)

Grease nipple is provided at the clutch adjuster to lubricate the clutch lifter.

The primary driven gear $②_1$ and the clutch outer $②_2$ are coupled through eight rubber dampers, forming an assembly which dampens vibration. Holes are incorporated in the clutch pressure plate to allow oil to flow, thus preventing "grabbing" clutch. (Fig. 3-73)

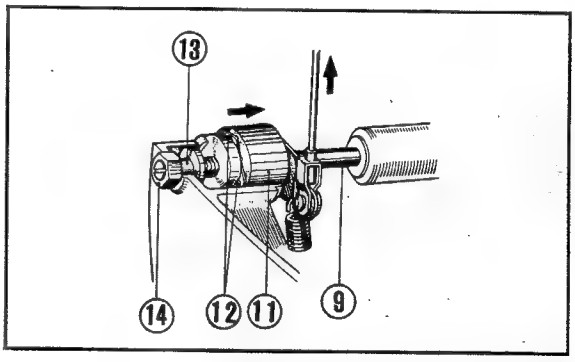
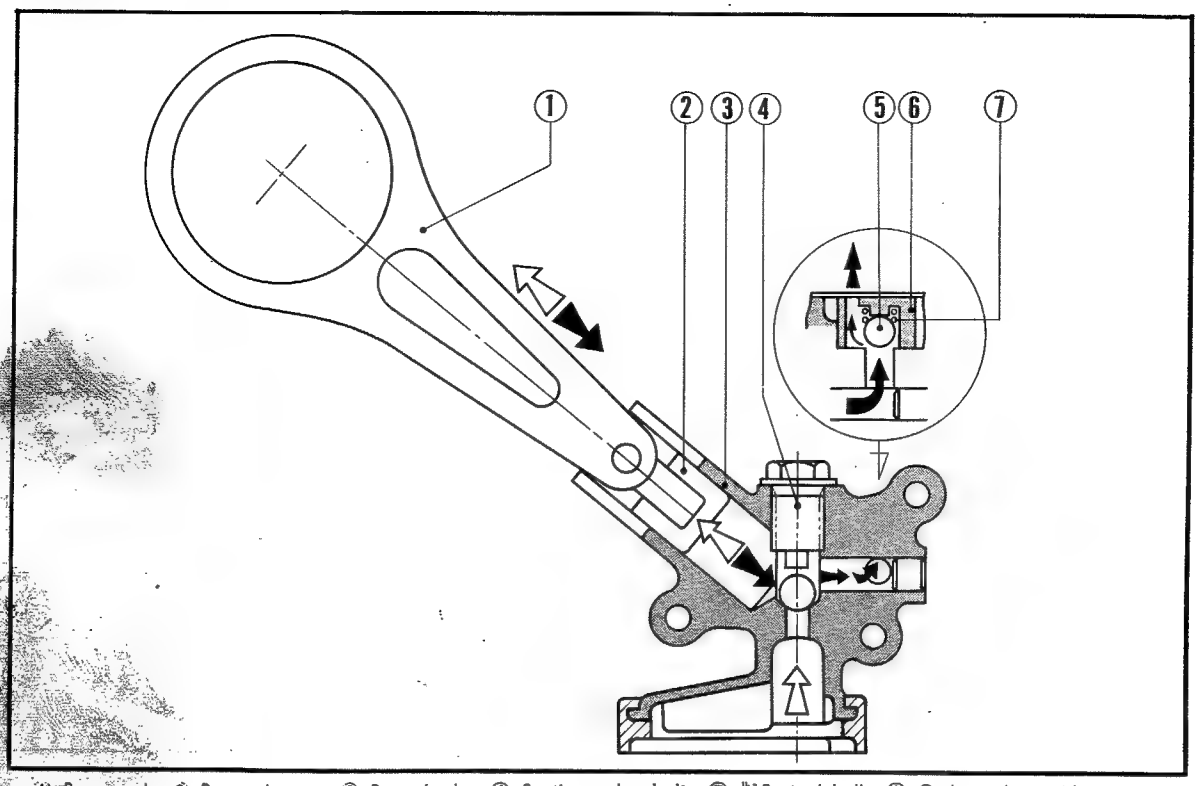


Fig. 3-74. Clutch adjusting mechanism



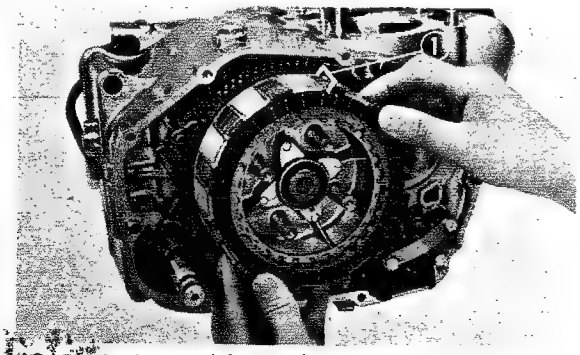
① Pump rod ② Pump plunger ③ Pump body ④ Suction valve bolt ⑤ #10 steel ball ⑥ Outlet valve guide ⑦ Outlet valve spring

Fig. 3-75. Sectional view of oil pump

H. Oil Pump Construction

The oil pump is durable and of simple construction, employing two steel balls for valves.

Pump plunger is mounted eccentrically on the clutch outer and is operated by the plunger rod. (Fig. 3-75)



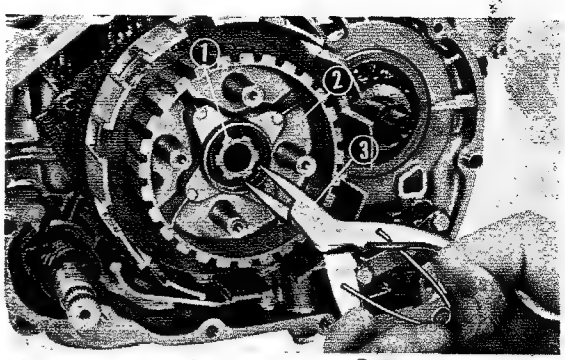
④ Clutch plate and friction disc

Fig. 3-76. Removing the clutch plates and friction discs

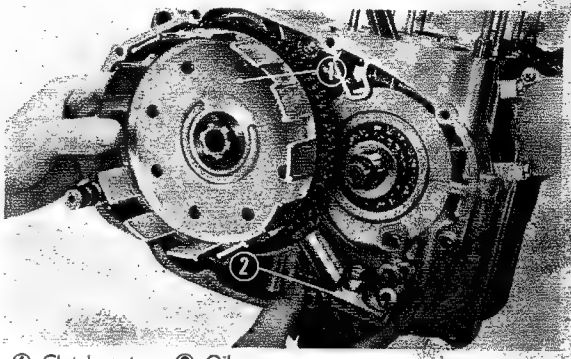
I. Clutch Disassembly

1. Remove the right crankcase cover in accordance with Section 3.3 B.
2. Remove the oil filter in accordance with Section 3.3 E.
3. Unscrew the four 6 mm bolts and remove the clutch spring pressure plate, friction disc and clutch plate. (Fig. 3-76)

4. Remove the 25 mm circlip and disassemble the clutch center. (Fig. 3–77)
5. Unlock the oil pump bolt locking washer and remove the bolt.
6. Remove the oil pump together with the clutch outer. (Fig. 3–78)



① 25 mm circlip ② Clutch center ③ Plier
Fig. 3–77. Removing the clutch center



① Clutch outer ② Oil pump
Fig. 3–78. Removing the clutch outer

J. Clutch Inspection

1. Friction disc

Item	Standard Value	Serviceable Limit
Thickness	2.62~2.78 mm (0.031~0.1095 in)	Replace if under 2.3 mm (0.906 in)

2. Clutch plate distortion (Fig. 3–79)

Item	Standard Value	Serviceable Limit
Distorsion	With in 0.15 mm (0.006 in)	Replace if over 0.3 mm (0.012 in)

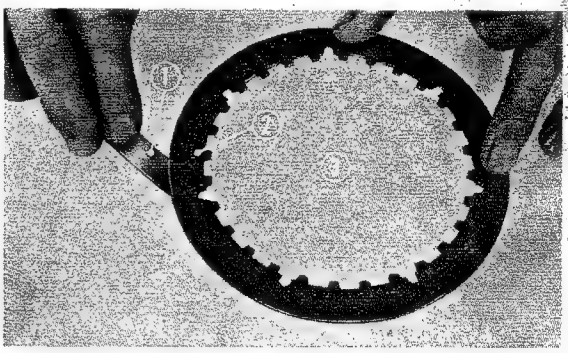
3. Clutch spring

CB/CL250

Item	Standard Value	Serviceable Limit
Free length	35.5 mm (1.39 in)	Replace if under 34.2mm (1.345 in)
Load	23.8kg/23 mm (52.4lb/0.906 in)	

CB/CL350

Item	Standard Value	Serviceable Limit
Free length	31.94 mm (1.258 in)	Replace if under 30.5 mm (1.2 in)
Load	31.4~33kg/23 mm (69.2~72.7lb/ 0.906 in)	



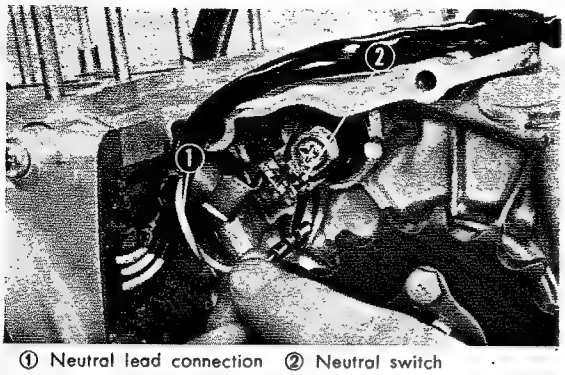
① Thickness gauge ② Clutch plate ③ Surface plate
Fig. 3–79. Measuring the distorsion of clutch plate

K. Clutch Reassembly

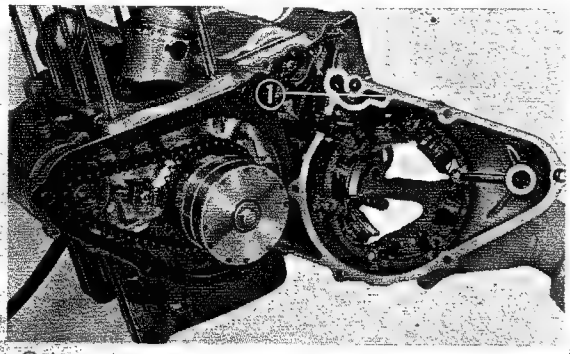
Reassemble the clutch in the reverse order of disassembly.

NOTE :

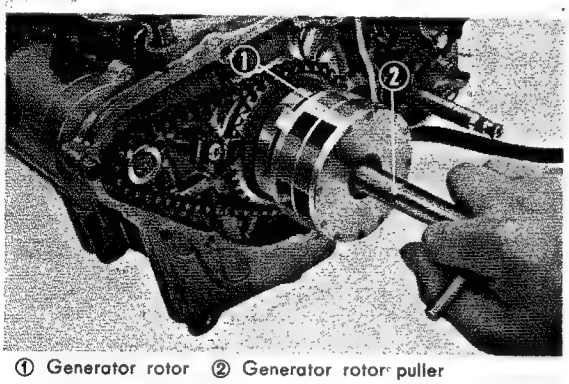
- Exercise care when installing the pump rod, installing pump rod in reverse will render the pump inoperative.
- The oil pump lock washer should be replaced with a new item.
- The circlip use to a set the clutch center is of a special dimension (25 × 1.5 mm) therefore exercise care that the standard circlip 25 mm, therefore, the standard 25 mm circlip is not to be used.



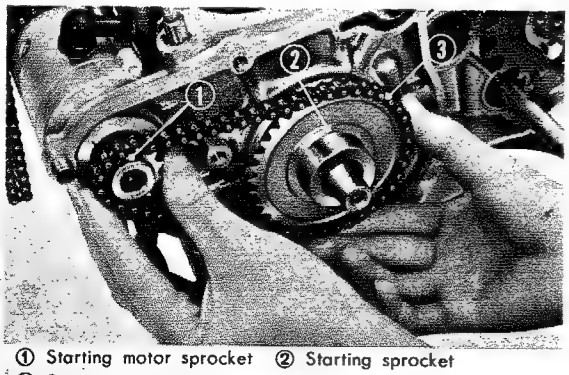
① Neutral lead connection ② Neutral switch
Fig. 3-80. Removing the neutral lead connection.



① L. crankcase cover
Fig. 3-81. Removing the L. crankcase cover



① Generator rotor ② Generator rotor puller
Fig. 3-82. Removing the generator rotor



① Starting motor sprocket ② Starting sprocket
③ Starting chain
Fig. 3-83. Removing the starting sprocket

3.4 CRANKCASE COVER (LEFT)

A. Construction

Left crankcase cover houses the generator and the starting clutch. The generator is not shielded from the lubricant and therefore, the oil seal is not used, thus simplifying construction.

B. Disassembly

1. Remove the neutral lead connection. (Fig. 3-80)
2. Remove the left crankcase cover. (Fig. 3-81)

   Remove the generator stator from the left crankcase cover by loosening the mounting nut.
3. Remove the ganerator rotor. (Fig. 3-82)
4. Remove the starting sprocket set plate, and take out the starting sprocket together with the starting motor sprocket. (Fig. 3-83)

C. Reassembly

1. Install the chain on the starting motor sprocket and install both sprockets at same time.
2. Install the starting sprocket set plate.
3. Set key and install generator rotor.

NOTE :

Insure that all the parts are free of foreign matter and that the starting clutch rotor has been properly assembly.

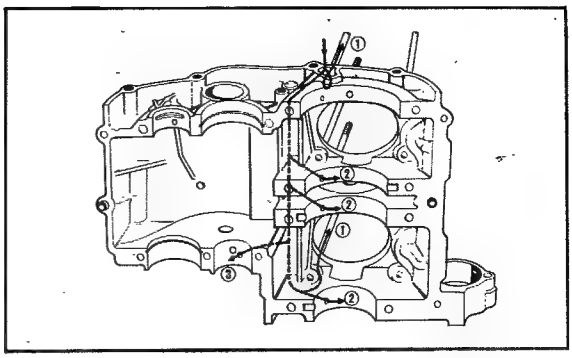
4. Check to make sure that the gasket is not damaged and properly installed on the left crankcase cover.
5. Install the neutral switch.

3.5 UPPER AND LOWER CRANKCASE

A. Construction

The upper and lower crankcase are aluminum alloy die casting and can be separated from the crankshaft, transmission mainshaft and countershaft. The oil under pressure is fed to the upper crankcase where it is branched and lubricate the crankshaft, transmission mainshaft and camshaft. (Fig. 3-4, 84)

The oil which has dropped to the lower crankcase flows into the chamber at the rear through an opening at the drain cock; the oil then flows from the right side through the passage to the right hand chamber. It is then picked up by the pump and delivered under pressure to the various units. In this way, the oil is continually, circulating, reducing the deterioration of the oil and maintaining a low oil temperature. (Fig. 3-40, 85)



① To camshaft ② To crankshaft ③ To mainshaft
Fig. 3-84. Upper crankcase oil passage

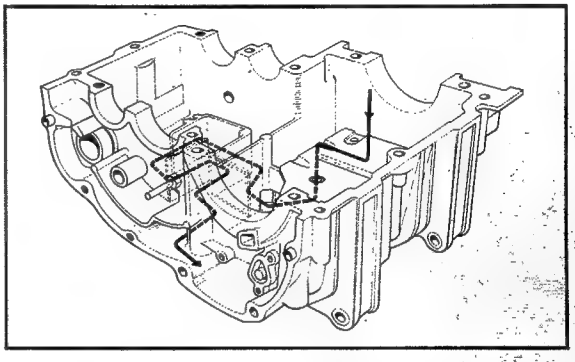
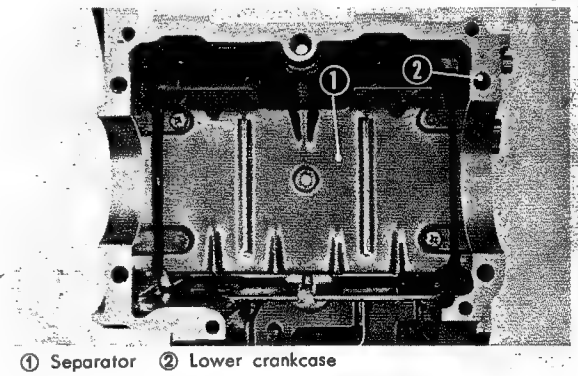


Fig. 3-85. Oil flow in the lower crankcase

B. Oil Separator Operation

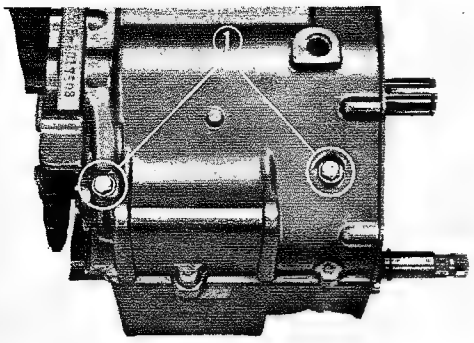
The oil separator is located in the forward section of the lower crankcase, directly below the crankshaft. Its primary function is to control the splash and oil foaming caused by the counterweights; prevent the oil from the penetrating into the combustion chamber and also controls oil temperature. (Fig. 3-86)



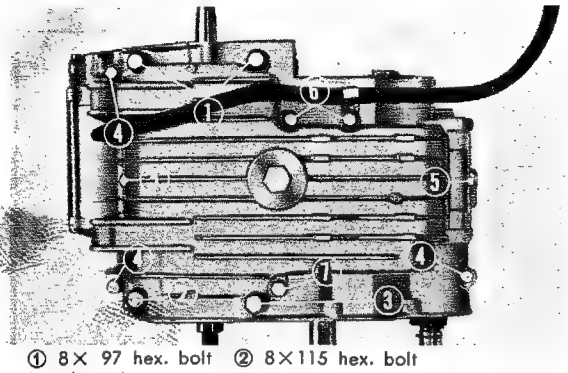
① Separator ② Lower crankcase
Fig. 3-86. Oil separator

C. Upper and Lower Crankcase Disassembly

1. Remove the left crankcase side cover, the generator, and the starting clutch in accordance with Section 3.4 B.
2. Remove the right crankcase cover in accordance with Section 3.3 B.
3. Separate oil filter in accordance with Section 3.3 E.
4. Remove the clutch in accordance with Section 3.3 I.
5. Gear shift spindle removal.
   Pull out the gear shift spindle exercising care not to damage the drum stop cam plate.
6. Loosen the two 6 mm hex bolts on the upper side, the four 8 mm hex bolts and eight 6 mm hex bolts on the under side, and remove the lower case.



① 6 mm hex. bolts
Fig. 3-87. Tightening upper crankcase



① 8× 97 hex. bolt ② 8×115 hex. bolt
③ 8×150 hex. bolt ④ 6× 56 hex. bolt
⑤ 6× 45 hex. bolt ⑥ 6×100 hex. bolt
⑦ 6×140 hex. bolt
Fig. 3-88. Tightening lower crankcase

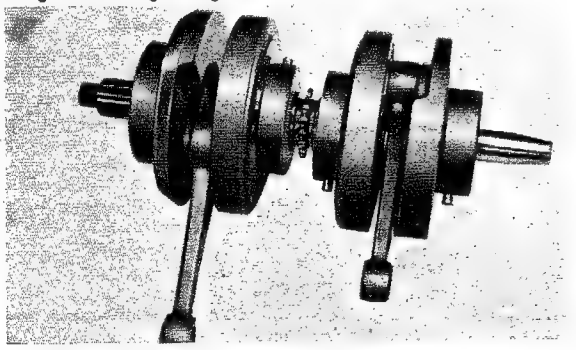


Fig. 3-89. Crankshaft

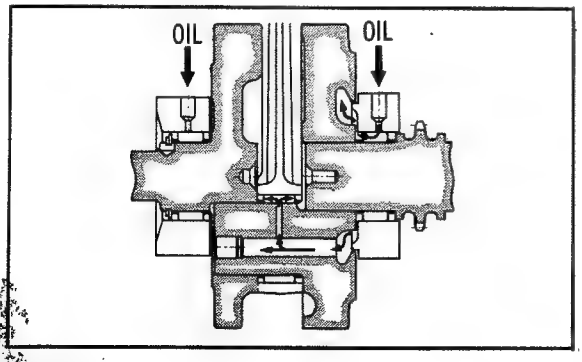


Fig. 3-90. Oil channel

D. Upper and Lower Crankcase Inspection

1. Check for damages especially around machine mating surfaces since even a small defect such as scratch will cause oil leaks. Repair should be made with an oil stone.

E. Upper and Lower Crankcase Reassembly

1. Check to make sure that the kick starter is properly engaged in the lower case. Apply liquid gasket to the machined mating surface of the lower case.

NOTE :

- Oil, solvent, stuck gasket should be completely removed from the mating machine surface.
- Do not permit the liquid gasket to get on the dowel pin hole or to surfaces other than the mating parts.
- Apply the liquid gasket evenly and smoothly.
- Allow the liquid gasket to set before joining the two crankcase halves.

2. Assemble the lower case.
3. Handle the starting motor cable and dynamo cord with care so as not to damage the clamps ; tighten the bolts. (Fig. 3-87, 88)

F. Crankshaft Construction

The crankshaft is constructed of high strength carbon steel and together with the connecting rod, converts the reciprocating motion of the piston to the rotary motion and, in addition, performs function of the flywheel by absorbing the fluctuating torque. On the crankshaft, starting sprocket and the AC generator are mounted. The cam chain drive sprocket is mounted and located in the center between the two throws. (Fig. 3-89). The oil under pressure is routed to the three bearing from the upper crankcase to lubricate the roller bearings. The oil to the two center bearings is further routed to the center oil passage in the crankpin to lubricate the large end of the connecting rod (Fig. 3-90). Groove are provided in the oil passages to function as centrifugal filters.

The crankshaft is supported at four points by heavy duty three roller bearings and a ball bearing; the outer race which is made of high carbon chrominum bearing steel (SUJ-2) for greater

strength and service life, are mounted in place with dowel pins. Further, main bearing are held in place by main bearing holder bolts, the right and left crankshaft, counter weight, center crankshaft are individual parts press fitted to make up the crankshaft assembly. It is therefore possible to use the roller bearing in the connecting rod large end and also in the main bearings.

The crankshaft balance which is so important in providing riding comfort, has been designed to a balance of 60%±5%.

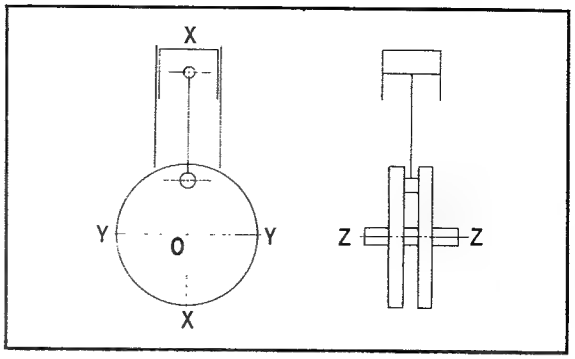


Fig. 3-91. Balance

(CRANKSHAFT BALANCE)

The balance "A" is computed by the following equation : $A = m/M \times 100$

m : Gyrating mass (m is the unbalanced obtained by subtracting the mass of the crankpin and the connecting rod from the total weight of the counterweight.

M : Reciprocating mass (piston, piston pin and connecting rod)

The X-X and Y-Y axes are shown in Fig. 3-91.

First, consider the case in which the crankshaft is perfectly balanced (m=0). The cycle of inertial force applied to the shaft "0" due to the reciprocating mass M in the X-X direction develops into engine vibration. This is called 0% balance. (Fig. 3-92)

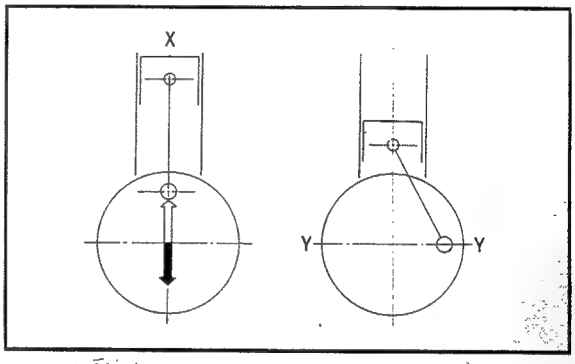


Fig. 3-92. 0% Balance

Next, if a weight equal to 30% of M (counterweight) is attached to the opposite side of the crankpin, the size of the inertial force in the direction of X-X is reduced to 0.7×M. However, the crankshaft becomes unbalanced (m-0.3) and develops a centrifugal force which will produce a vibration in the Y-Y direction. This is called 30% balance (Fig. 3-93). In other words, the vibration in the X-X direction has diminished but increased in the Y-Y direction by the like amount. This total has been expressed in percentage.

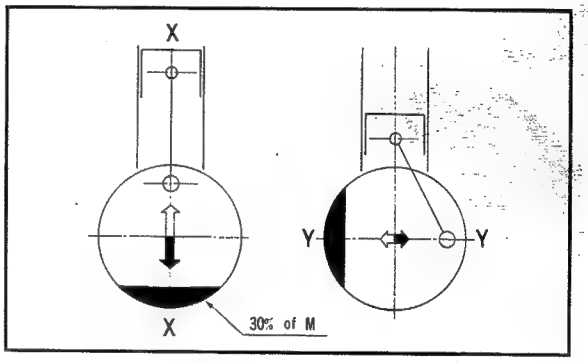


Fig. 3-93. 30% Balance

If the counterweight is made equal to M, the total vibration in the X-X direction will be transferred to the Y-Y direction. This is called 100% balance. (Fig. 3-94)

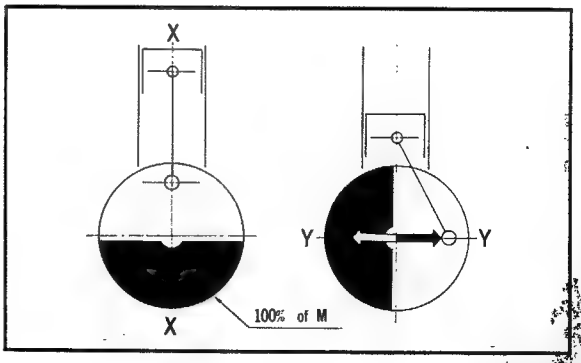


Fig. 3-94. 100% Balance

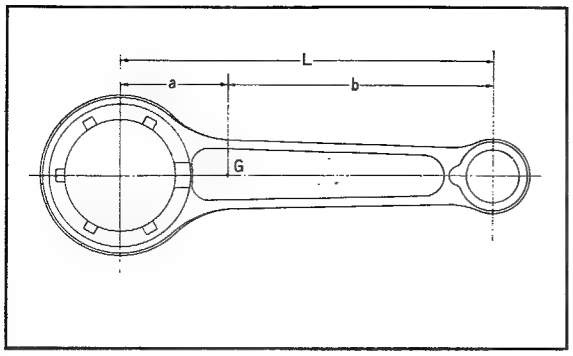


Fig. 3-95. Connecting rod rotating and reciprocating mass

G. Connecting Rod Construction

The connecting rod (commonly call conrod) is a link connecting the piston and the crank pin. The small end which is connecting to the piston performs reciprocating motion while the large end connected to the crank pin performs the rotory motion. The connecting rod, therefore, receives a combination of different forces. The connecting rod mass is divided into the rotating mass and the reciprocating mass in the ratio to the distance from the connecting rod centroid. The center of the connecting rod masses is assumed by having the rotating mass concentrate at the large end and the reciprocating mass at the small end. (Fig. 3-95)

The connecting rod is an H shaped forging made of chrome molybdenum steel with needle roller bearings install in the large end.

H. Crankshaft Disassembly

1. Remove the cylinder head and cylinder in accordance with Section 3.2 B.
2. Separate the piston in accordance with Section 3.2 W.
3. Separate the lower crankcase in accordance with Section 3.5 C.
4. Unscrew the center bearing cap bolts and remove the crankshaft.

I. Crankshaft Inspection

1. Crankshaft runout (Fig.3-96)

Support point	Measuring point	Standard Value
Support C&D	A, B, E, F	0.1mm (0.004 in) Max
	G, J	0.02 (0.0008 in) Max
Support both main bearing	G, J	0.02 (0.0008 in) Max

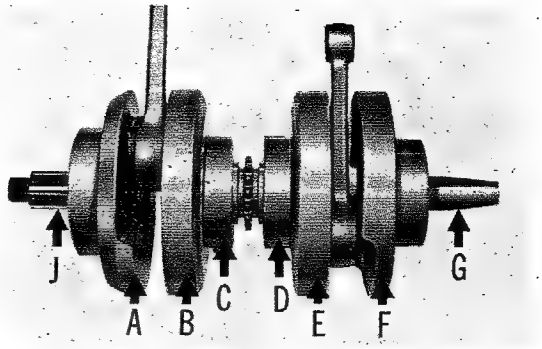
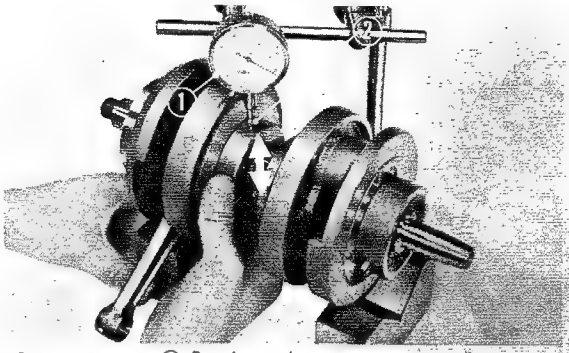


Fig. 3-96. Crankshaft runout measuring

2. Main bearing diametrical clearance (Fig. 3-97)

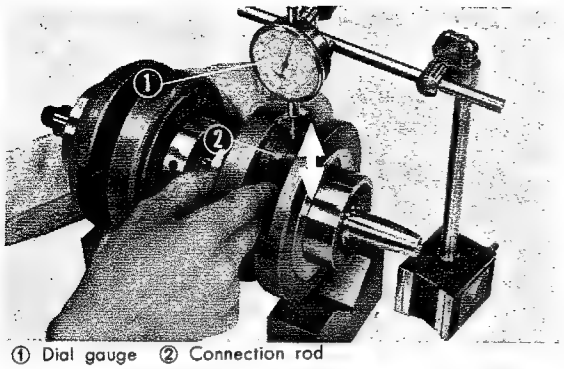
Item	Standard Value	Serviceable Limit
	0.012~0.02mm (0.0005~0.0008 in)	Replace if over 0.05mm (0.002 in)



① Dial gauge ② Bearing outer race
Fig. 3-97. Measuring the diametrical clearance

3. Connecting rod small end internal diameter

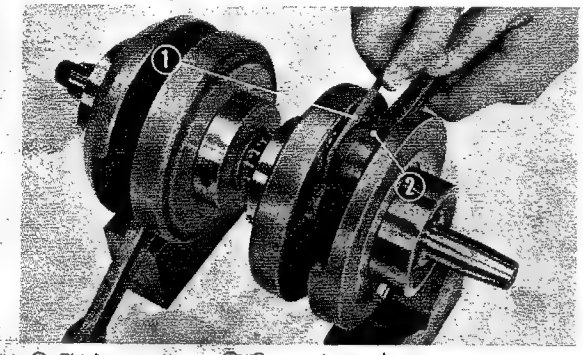
Item	Standard Value	Serviceable Limit
Small end inner dia.	15.016~15.034mm (0.591~0.592 in)	Replace if over 15.07mm (0.593 in)



① Dial gauge ② Connection rod
Fig. 3-98. Measuring the connecting rod diametrical clearance

4. Diametrical clearance of the connecting rod large end (Fig. 3-98)

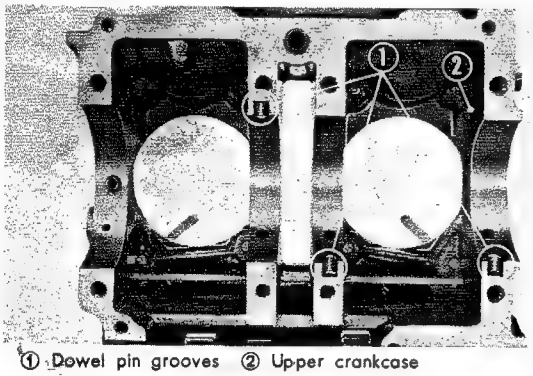
Item	Standard Value	Serviceable Limit
Diametrical clearance	0.004~0.012mm (0.0002~0.0005 in)	Replace if over 0.05mm (0.002 in)



① Thickness gauge ② Connecting rod
Fig. 3-99. Measuring the connecting rod side clearance

5. Connecting rod side clearance (Fig. 3-99)

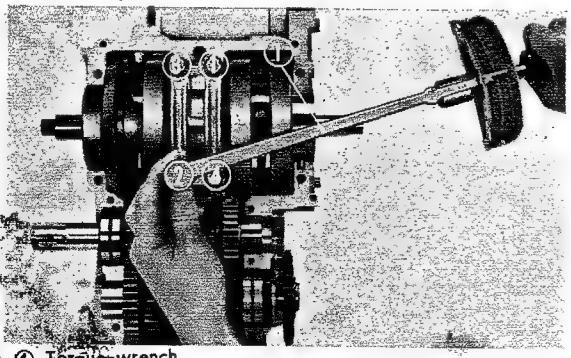
Item	Standard Value	Serviceable Limit
Side clearance	0.1~0.33mm (0.004~0.013 in)	Replace if over 0.6mm (0.023 in)



① Dowel pin grooves ② Upper crankcase
Fig. 3-100.

J. Crankshaft Reassembly

1. At this time, the dowel pin on the bearing outer case is firmly installed into the crankcase. (Fig. 3-100)
2. From hereafter, follow the reassembly procedure.



① Torque wrench
Fig. 3-101. Tightening the bearing cap bolts

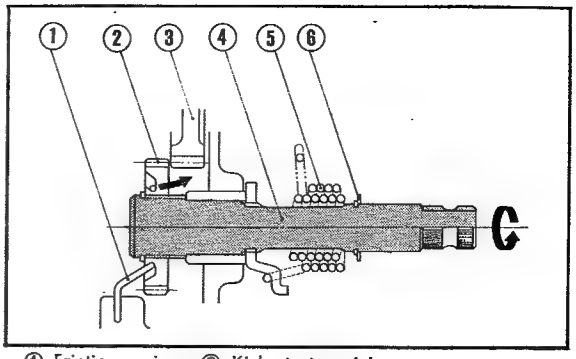
NOTE:

Uniformly tighten the four center bearing cap bolts in a diagonal sequence to **160~210 kg. cm (11.6~15.2 ft. lb)** torque. (Fig. 3-101)

K. Kick Starter Construction

The kick starter spindle rotates counter clockwise when the kick starter pedal is pressed by applying the weight of the rider. A kick starter pinion supported by a friction spring is mounted on the left end of the kick starter spindle when the left hand screw is machined. When the kick starter is pressed, the kick starter pinion is forced against and meshes with the countershaft low gear by the action of the screw on the spindle, causing the C_1, M_1, (M) gears to be driven and transmitting the pedal force to rotate the crankshaft through the clutch. (Fig. 3–102)

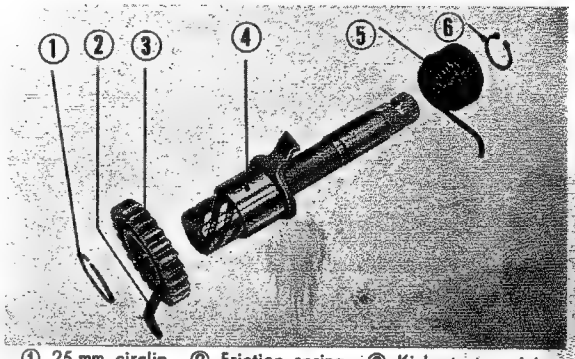
Releasing the kick starter pedal causes the kick starter spindle to rotate clockwise and return to normal position by the action of the kick starter spring.



① Friction spring ② Kick starter pinion
③ Countershaft low gear ④ Kick starter spindle
⑤ Kick starter spring ⑥ 18 mm washer
Fig. 3–102. Kick starter mechanism

L. Kick Starter Disassembly

1. Disassemble the upper and lower crankcase in accordance with Section 3.5 C.
2. Remove the kick starter spring.
3. Remove the 25 mm circlip.
4. Disassemble the kick starter spindle. (Fig. 3–103)



① 25 mm circlip ② Friction spring ③ Kick starter pinion
④ Kick starter spindle ⑤ Kick starter spring
⑥ 18 mm circlip
Fig. 3–103. Component parts of kick starter spindle

M. Kick Starter Inspection

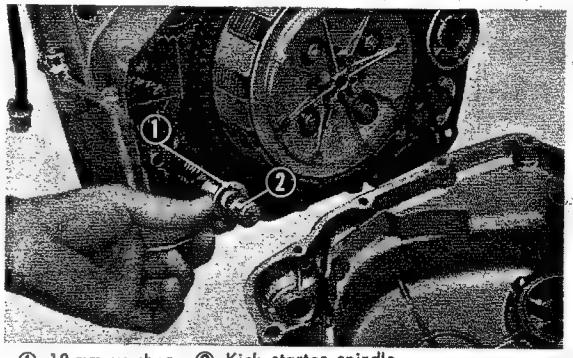
Check the kick starter spindle and pinion, if damaged or worn, replace with a new part.

N. Kick Starter Reassembly

Reassemble the kick starter components in the reverse procedure of disassembly.

NOTE :

Do not forget to install the 18 mm circlip and the 18 mm washer.



① 18 mm washer ② Kick starter spindle
Fig. 3–104. Installing the 18 mm washer

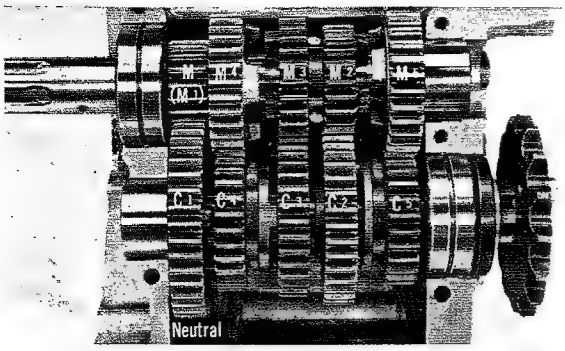


Fig. 3-105. Neutral

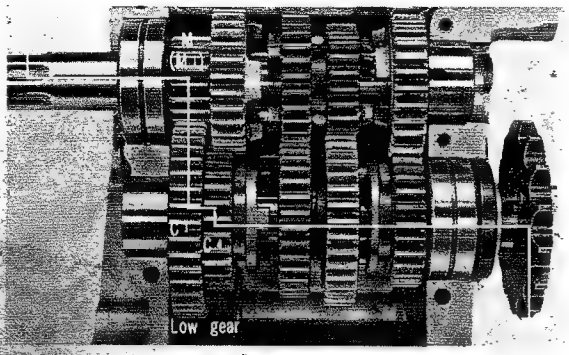


Fig. 3-106. Low gear

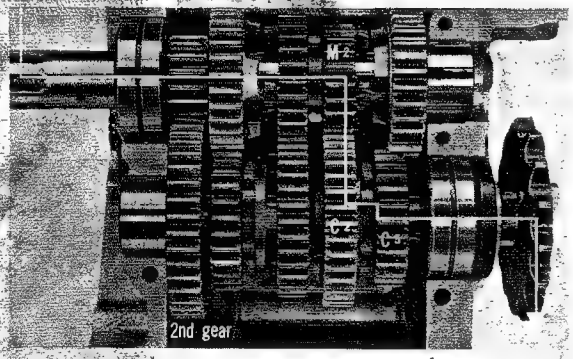


Fig. 3-107. Second gear

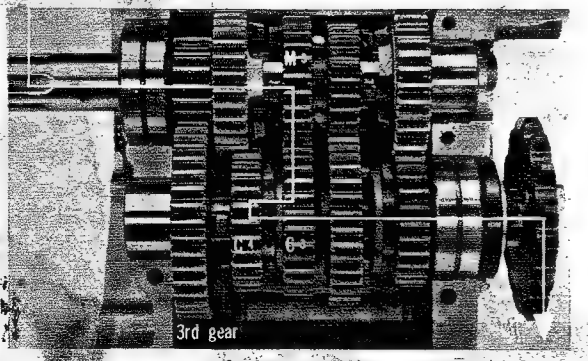


Fig. 3-108. Third gear

O. Transmission

When the clutch is engaged, the power from the crankshaft is transmitted through the clutch assembly to drive the transmission main shaft (M). During the shifting of the transmission gears, the clutch is disengaged to stop the rotation of the main shaft.

The position of the gears will be described in reference to the neutral gear.

NEUTRAL : (Fig. 3-105)

When the transmission is in neutral, the gears in the transmission are arranged so that there is no power transmitted from the transmission main shaft (M) to the counter shaft (C). The fixed main shaft low gear (M 1) is meshed with the free rotating counter shaft low gear (C 1), free rotating main shaft top gear (M 5) is meshed with the sliding counter shaft top gear (C 5), sliding main shaft second-third gears (M 2-3) are meshed with the free rotating counter shaft second-third gears (C 2-3) and the free rotating main shaft fourth gear (M 4) is meshed with the splined counter shaft fourth gear (C_4).

LOW : (Fig. 3-106)

The power from the main shaft low gear (M 1) is transmitted to the free rotating countershaft low gear (C 1), however, the splined countershaft fourth gear (C 4) is engaged to the countershaft low gear through a dog, to drive gear (C 4) is engaged to the countershaft low gear through a dog, to drive the countershaft which has the drive sprocket mounted on the end of the shaft.

SECOND : (Fig. 3-107)

The power from the main shaft second gear (M 2) is transmitted to the free rotating countershaft second gear (C 2), however, the dog on the countershaft top gear (C 5) is engaged with the countershaft second gear so that the power to transmitted to the countershaft which drives the drive sprocket mounted on the end of the shaft.

THIRD : (Fig. 3-108)

Power from the main shaft third gear (M 3) is transmitted to the free ratating countershaft third gear (C 3). The splined counter shaft fourth gear (C 4) is engaged to the countershaft third gear through a dog and drives the countershaft and the drive sprocket on the end.

FOURTH (Fig. 3-109)

The free rotating main shaft fourth gear (M 4) receives its drive power by being engaged to the M 2, M 3 gears by a dog. The power of the main shaft is thus transmitted from M 4 to the countershaft fourth gear (C 4) to drive the countershaft and the drive sprocket on the end.

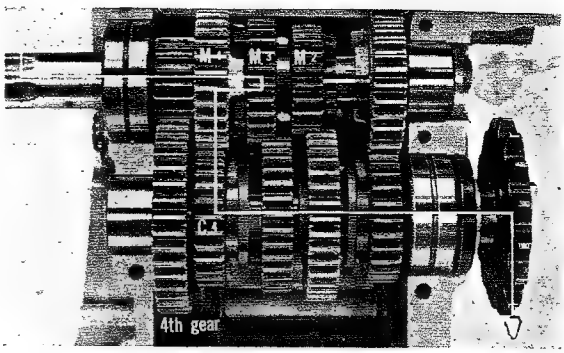


Fig. 3-109. Fourth gear

TOP (Fig. 3-110)

The free rotating main shaft fifth gear (M 5) receives it drive power by being engaged to M 2 – M 3 gears by a dog. The power of the main shaft is thus transmitted from M 5 to the countershaft fifth gear (C 5) to drive the countershaft and the drive sprocket on the end.

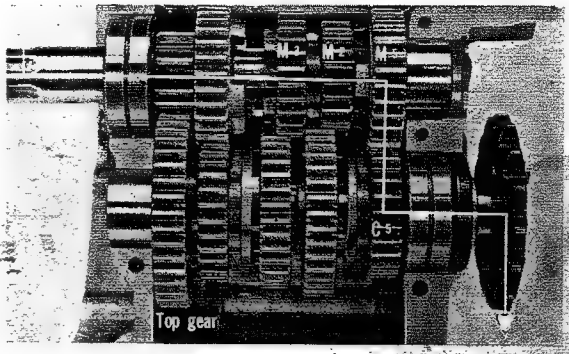


Fig. 3-110. Top gear

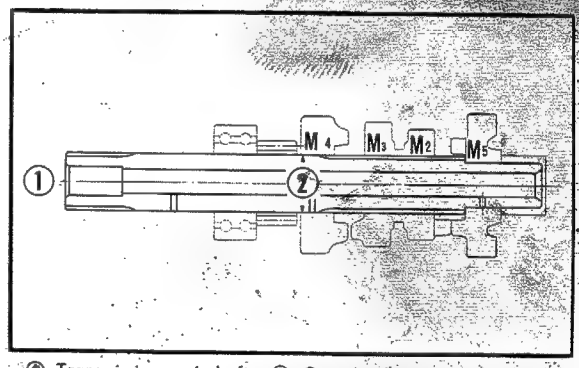
P. Transmission Disassembly

The transmission can be disassembled by separating the upper and lower crankcase in accordance with the instructions in section 3.5 C.

Q. Transmission Inspection

1. Main shaft, gear clearance (Fig. 3-111A)

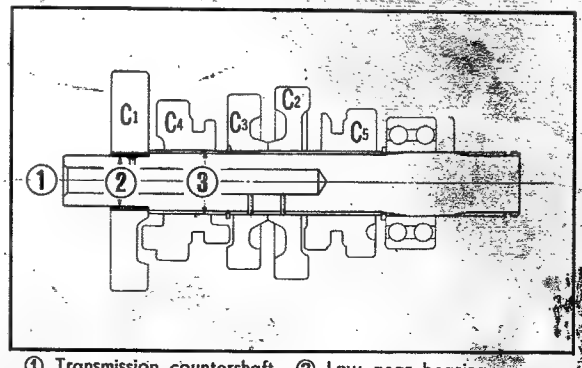
	Gear inner diameter	Shaft diameter	Standard clearance
Fourth & Top	25.0~25.021 mm (0.984~0.985 in)	24.959~24.98 mm (0.9826~0.9834 in)	0.02~0.062 mm (0.0008~0.0024 in)



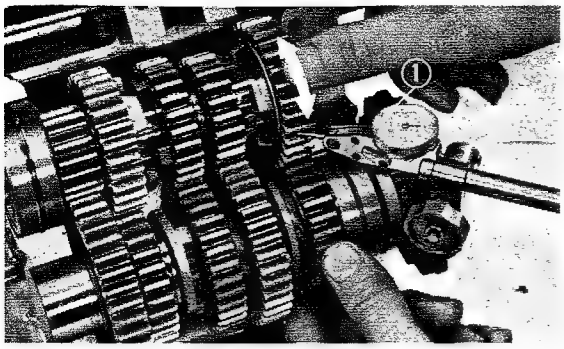
① Transmission mainshaft ② Outside diameter
Fig. 3-111A.

2. Counter shaft gear (Fig. 3-111B)

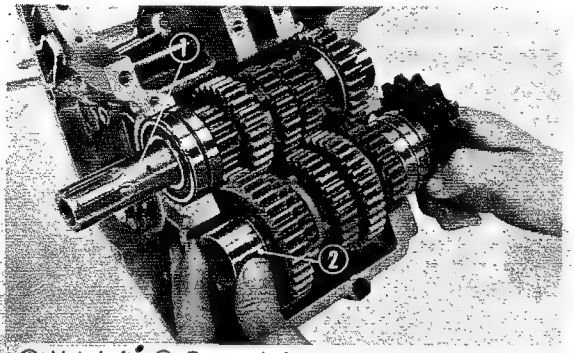
	Gear inner diameter	Shaft diameter	Standard clearance
Low	20.02~20.041 mm (0.788~0.789 in)	19.987~20.00 mm (0.7869~0.7874 in)	0.02~0.054 mm (0.0008~0.002 in)
Second & third	25.02~25.041 mm (0.985~0.986 in)	24.957~24.98 mm (0.9826~0.9835 in)	0.04~0.084 mm (0.0016~0.003 in)



① Transmission countershaft ② Low gear bearing outer diameter ③ Outer diameter
Fig. 3-111B.



① Small dial test
Fig. 3-112. Measuring the gear backlash



① Mainshaft ② Countershaft
Fig. 3-113. Assembling the gears

3. Backlash. (Fig. 3-112)

Item	Standard Value	Serviceable Limit
Low, 2nd, 3rd	0.044~0.133mm (0.0017~0.0052 in)	Replace if over 0.2 mm (0.008 in)
4th, Top	0.046~0.140mm (0.0018~0.0055 in)	Replace if over 0.2 mm (0.008 in)

R. Transmission Reassembly

Reassemble in the reverse sequence of disassembly.

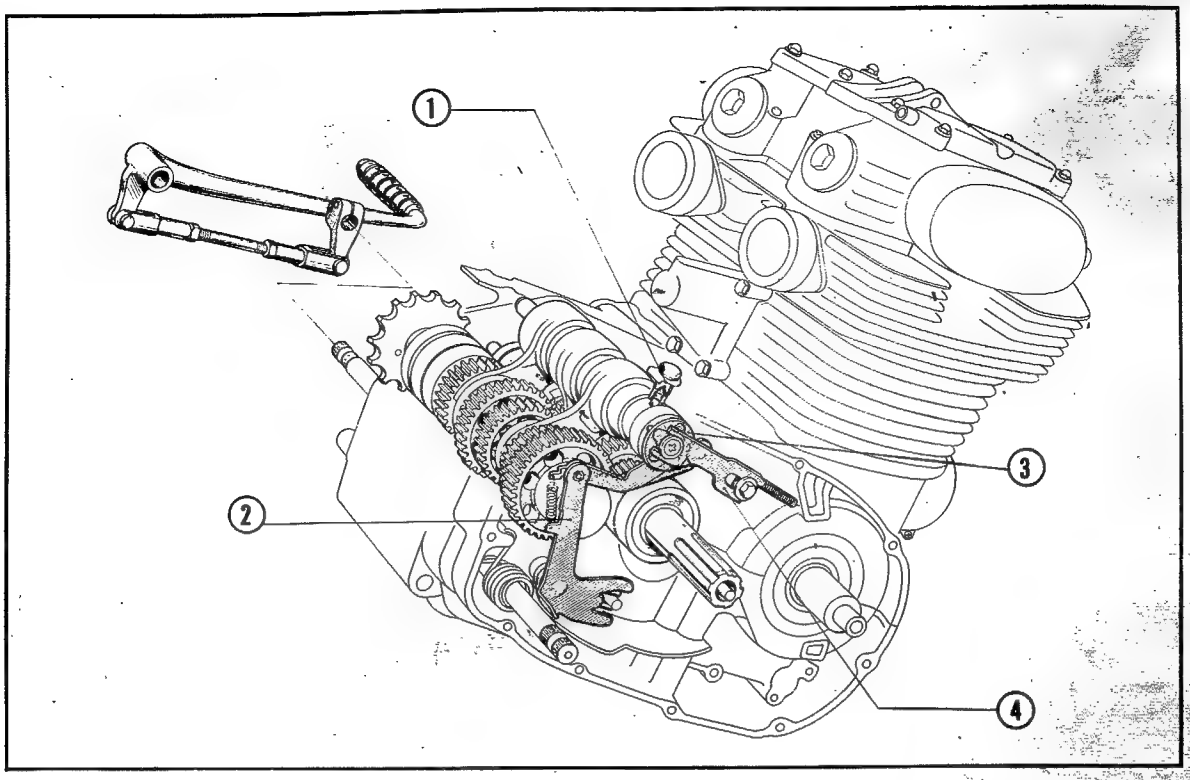
NOTE :

- Make sure that the thrust washers and circlips are installed on the M 4, C 2 and C 3 gears.
- When assemblying the becrings to the main shaft and countershaft, make sure that the bearing with the oil groove is installed on the countershaft and the bearing without the oil groove on the main shaft.
- The installation of the bearing set ring and the dowel pin must not be forgotten.
- Assemble the left shift fork on gear C 4, right shift fork on gear C 5 and the center shift fork on gear M 2-M 3, and then assembly the main shaft and the coutershaft in set. (Fig. 3-113)

S. Gear Shift Construction

When the gear change pedal is pressed, the gear shift spindle will rotate, causing the gear shift arm to push the drum pin located on the drum, with a pawl and causes the drum to rotate. When the shift drum rotates, the shift fork will move sideways due to it being install in the three grooves at the center at the shift drum center. This will move the M_2~M_3, C_4 and C_5 gears.

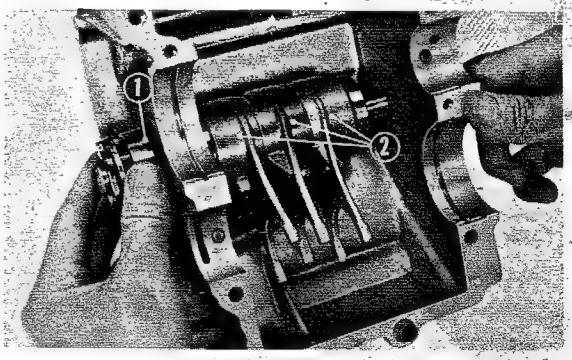
Shift drum stopper functions as a stopped and since it applies a direct force against the groove, it assures positive change action. The gear shift return spring will return the gear change pedal to the original position when released, and place it in position for the next gear change. The neutral switch indicates the neutral position of the gear, and is held in this position by the ball through the upper crankcase through the neutral stopper. (Fig. 3-114)



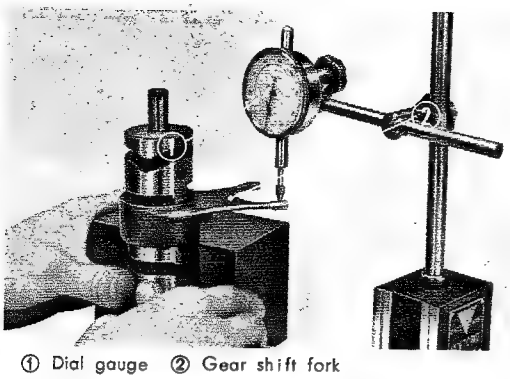
① Neutral stopper ② Gear shift arm ③ Drum stopper plate ④ Shift drum stopper
Fig. 3-114. Gear shift mechanism

T. Gear Shift Disassembly

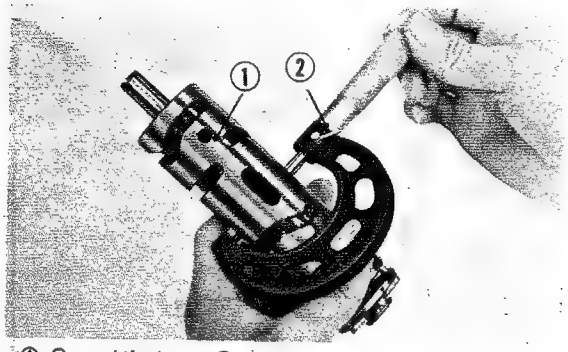
1. Remove the gear shift spindle in accordance with section 3.5 C.
2. Separate the upper and lower crankcases in accordance with section 3.5 C.
3. Remove the neutral stopper from the upper crankcase.
4. Disassemble the transmission gears.
5. Remove the neutral switch rotor and then separate the shift drum stopper.
6. Remove the shift fork guide pin clip and then pull out the guide pin.
7. Remove the gear shift drum by lightly tapping the case on the side of the neutral switch mounting. (Fig. 3-115)



① Gear shift drum ② Gear shift forks
Fig. 3-115. Removing the gear shift drum



① Dial gauge ② Gear shift fork
Fig. 3-116. Measuring the flatness of gear shift fork



① Gear shift drum ② Micrometer
Fig. 3-117. Measuring the outer diameter

U. Gear Shift Inspection

1. Gear shift fork (Fig. 3-116)

Item		Standard Value	Serviceable Limit
Inner dia.		40.0~40.025mm (1.575~1.576 in)	Replace if over 40.1mm (1.579 in)
Thickness	A (Fitted to C4, C5)	4.93~5.0mm (0.194~0.197 in)	Replace if under 4.6mm (0.181 in)
	B (Fitted to M2-M3)	5.93~6.0mm (0.233~0.236 in)	Replace if under 5.6mm (0.22 in)

2. Gear shift fork guide groove (Fig. 3-117)

Item	Standard Value	Serviceable Limit
Groovewidth	6.05~6.15mm (0.238~0.242 in)	Replace if over 6.5mm (0.25 in)

V. Gear Shift Reassembly

1 Assemble the gear shift drum into the upper case. At this time make sure that the location of the shift fork are in their respective position.

The two outside and the center gear shift forks are different.

NOTE :

When assemblying the gear shift drum, exercise care not to damage the oil seal press fitted into the crankcase.

2. Install the shift fork guide pin into the shift fork and lock with a clip.
3. Assemble the shift drum stopper, neutral switch rotor.
4. Reinstall the transmission gear assembly.
5. Assemble the lower crankcase to the upper crankcase.
6. Reinstall the gear shift spindle.

NOTE :

Check to make sure that the action of the gear shift fork is smooth.

7. Reassemble the remaining components.

3.6 CARBURETOR

The function of the carburetor is to supply fuel to the engine is already well known, however, the outstanding feature of the CV carburetor is a constant pressure, single barrel, compound carburetor brought about by the automatic changing of the venturi area by the vacuum pressure of the engine. Each cylinder is equipped with a single carburetor of this type which provides the following advantages to engines having a broad speed range and a high power output.

1. Because of the variable venturi design, the transition between the first and second stage is exceptionally smooth.
2. The construction is very simple due to the single barrel feature.
3. Excellent acceleration and good economy is assured.

I. Air flow (Fig. 3–118)

The air which passes the air cleaner flows through the air inlet ①, venturi ②, throttle valve ③ and enters the cylinder through the inlet port. The vacuum piston ④ is protruding into the venturi area ② and by the action of the vacuum piston spring ⑤, the venturi is held toward the closing side. When there is only a small amount of air being taken into the engine, the vacuum piston ④ is in the lowered position, forming the primary venturi ⑥. The air velocity in the venturi area ② is maintained constant, affording good atomization of the fuel. With an increase in the air flow, the vacuum pressure in the venturi increases, causing the vacuum piston to rise due to the pressure applied to the top of the piston. The venturi area is increased by the amount of the rise of the piston which is in proportion to the vacuum pressure.

When the engine reaches maximum rpm, the vacuum piston reaches the top as shown in Fig. 3–121 and becomes the secondary venturi to provide sufficient venturi area for maximum power output.

II. Fuel flow

The carburetor known as double nozzle type is divided into slow, primary, and the secondary systems.

a. Slow system

The fuel enters the primary main jet ⑦ and flows through passage ⑧ to the slow jet ⑨ where it is metered and mixed with the air from the slow air jet ⑩. The fuel mixture is drawn into the engine from the pilot outlet ⑪ and bypass ⑫ located in the vicinity of the throttle valve. The fuel flow from the pilot outlet is controlled by the pilot screw ⑬. (Fig. 3–118, 119)

b. Primary system

Part of the fuel which enters the primary main jet ⑦ flows to the slow speed system described above, but major portion of the fuel is mixed with the air from the primary air jet ⑮ within the main nozzle ⑭ and is discharged from the main nozzle to the inside of the venturi.

c. Secondary system

The fuel which enters the secondary main jet ⑯ is mixed with the air from the secondary air jet ⑱ within the needle jet holder ⑰ and is discharged, however, while the vacuum piston is operating, the air flow hardly changes, and therefore, the pressure in the vicintity of all the jets are constant, and the result is that fuel flow does not increase in the same proportion to the air volume. To correct this condition, a jet needle ⑲ has been installed in the secondary system to regulate the fuel flow.

III. Float system

The carburetor must provide a proper mixture of fuel at different throttle openings and engine speeds. In order to accomplish this, the fuel level in the carburetor must be maintained constant. The float functions to serve this purpose. The fuel from the tank enters the float chamber ㉓ through the fuel passage ⑳ between the valve seat ㉑ and valve ㉒ and fills the chamber to the level where the float ㉔ rises to shut off the flow of the fuel by seating the valve against the valve seat by the action of the float arm ㉕. As the fuel is consumed the fuel level drops in the float chamber, the float will follow the fuel level and the fuel will start to enter the chamber between the opening of the valve and valve seat to maintain a constant fuel level. This sequence is recycled to maintain a constant fuel level. A spring is incorporated in the valve and which comes in contact with the float arm, this design is to prevent the vibration of the valve.

IV. Choke

For starting in cold weather, a rich fuel mixture is momentarily required; to serve this purpose, a choke valve ㉖ is incorporated in the carburetor. The choke valve is closed by lowering the choke lever ㉘, by so doing, the air flow is restricted and the fuel that is discharged from the needle jet is taken into the engine in a rich mixture.

Further, a relief valve ㉗ is incorporated in the choke valve so that the choke lever may be left in the lowered position for starting and returned to the normal position only after the engine warms up to operating temperature.

Operation and Adjustment

1. Idling

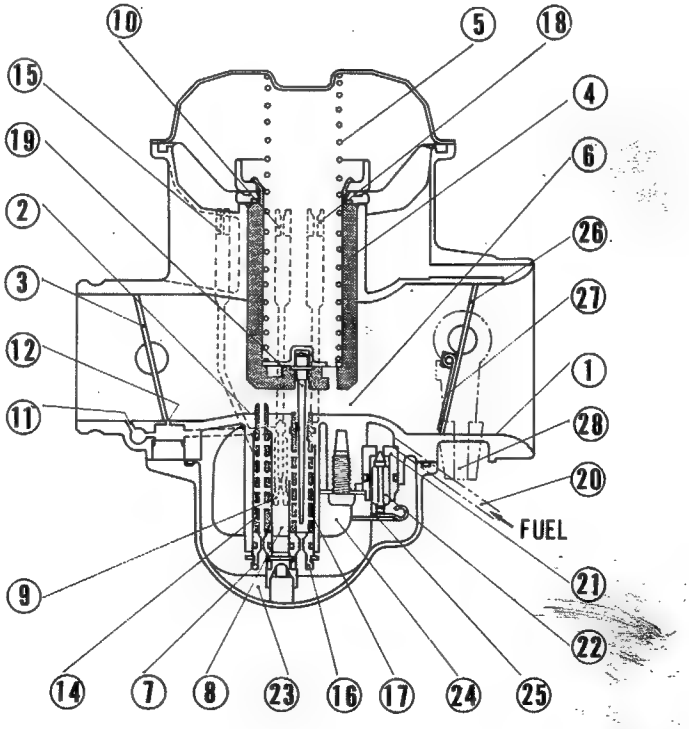


Fig. 3-118. Sectional view of carburetor

Set the throttle valve so that it is practically closed; the fuel will then be drawn from the pilot outlet ⑪. The fuel mixture adjustment is made by turning the pilot screw ⑬. Turning the screw out will give a rich mixture. For normal adjustment, turn the screw all the way in and back off by the same amount for both carburetors. When making the final adjustment, stay within 1/8 to 1/4 turn of the specified setting.

2. Slow speed and cruising system (Fig. 3–118, 119)

   The throttle valve is slightly open and the fuel is mainly discharged from the bypass. To change the mixture ratio, replace the slow jet ⑨.

3. Intermediate speed system (Fig. 3–118, 120)

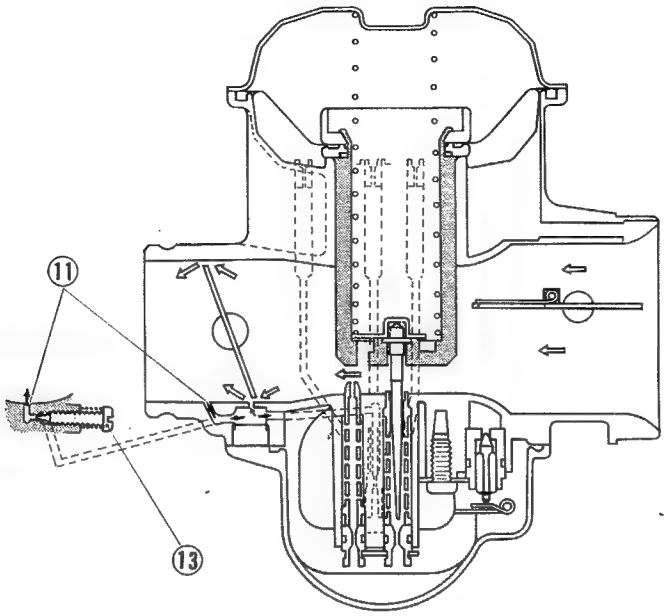


Fig. 3–119. Sectional view of carburetor

The position of the throttle valve is at a larger opening then in the previous condition. As the vacuum piston show almost no action in this condition, the fuel is mainly discharge from the main nozzle ⑭. The fuel mixture adjustment is made with the primary main jet ⑦. A certain amount of the fuel is also discharged from the needle jet ⑰ and since the jet needle ⑲ will also affect the adjustment the adjustment should also be made in conjunction with the following section.

4. High Speed System (Fig. 3–118, 120)

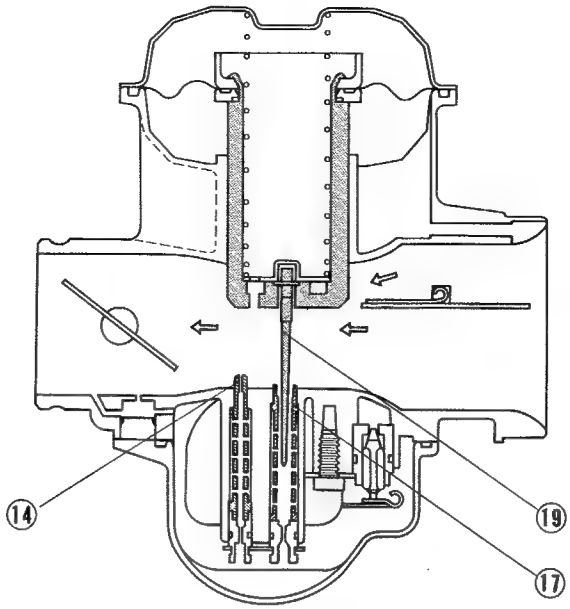


Fig. 3–120. Sectional view of carburetor

The position of the throttle valve is at a larger opening then in the previous condition. The vacuum piston starts to rise and the fuel is discharged from both the main nozzle ⑭ and the needle jet ⑰. With the further rise in the vacuum piston the fuel discharge from the needle jet ⑰ increases correspondingly. The adjustment in mixture ratio is made by changing the steps on top of the jet needle. Raising the jet needle will richen the fuel mixture (the carburetor with nonadjustable type jet needle is also available).

5. Maxinuum Speed System (Fig. 3–118, 121)

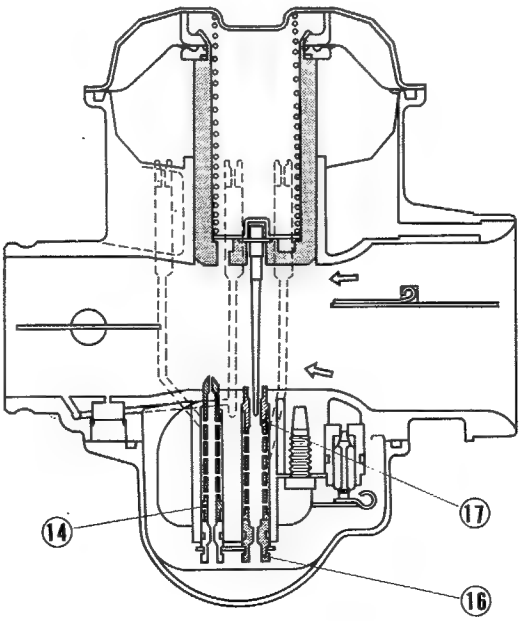


Fig. 3–121. Sectional view of carburetor

Both the throttle valve and the vacuum piston are in full open position and the fuel mixture is discharged from both the main nozzle ⑭ and the needle jet ⑰. The adjustment in mixture ratio is made by turning the secondary main jet ⑯.

CARBURETOR SETTING TABLE

Item \ Model	CB/CL250			CB/CL350
Setting make	250A			350A
Venturi bore diameter	Primary		13.4 mm	14.5
	Secondary		27.4 mm	28.0
M. J. (Main jet)	Primary		#55	#60
	Secondary		#110	#115
A. J. (Air jet)	Primary		#50	#50
	Secondary		#50	#50
Air bleed (Needle jet holder)	Primary	AB1	0.5×2	0.5×2
		AB2	——	——
		AB3	0.5×2	0.5×2
		AB4	——	——
		AB5	0.5×2	0.5×2
	Secondary	AB1	0.6×2	0.6×2
		AB2	0.6×2	0.6×2
		AB3	——	——
		AB4	——	——
		AB5	0.6×2	0.6×2
N. J. (Needle jet)	2.6 mm×2.8r			2.6×2.8r
J. N. (Jet needle)	2.395 mm, 3°30′			2.595, 3°30′
Throttle valve	α=13° t=1.0 mm			12° 1.0 mm
P. O. (Pilot outlet)	0.8 mm			0.8 mm
B. P. (By-pass)	BP1		0.8	0.8
	BP2		0.7	0.7
S. J. (Slow jet)	#35			#38
	AB1		0.6×2	0.6×2
	AB2		0.6×2	0.6×2
	AB3		0.6×2	0.6×2
P. J. (Pilot jet)	#35			#38
S. A. J. (Slow air jet)	#90			#90
P. S. (Pilot screw)	1⅛±⅛			¾±⅛
V. S. (Vlve seat)	2.2 mm			2.2 mm
VP. SP. (Vacuum piston spring)	30~50 gr			40~60 gr
Float height	21±0.5			19±0.5

MEMO

4. FRAME

4.1 HANDLEBAR

A. Construction

The handlebar on the Honda 250/350 have been designed particularly to provide comfort and prevent riding fatigue caused from long distance traveling; high speed riding and operating on rough roads. CL250/350 has the fully raised handlebar, whereas, the CB250/350 are semi-raised typed handlebar.

Handlebar is mounted on the fork top bridge plate and is fixed with two handle pipe holder clamps. (Fig. 4–1)

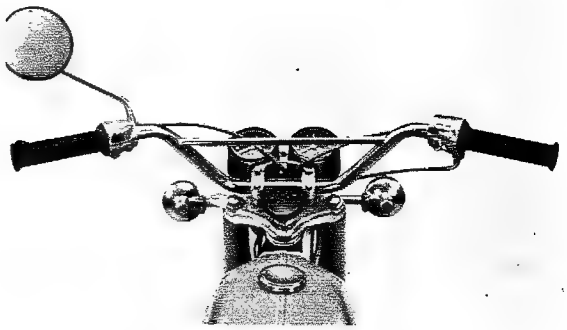


Fig. 4–1. External view of handlebar

B. Disassembly

1 Disconnect the front brake cable at the lower end by loosening the front brake adjusting bolt nut, move the brake arm toward the braking position to providing slack to the cable, and then disconnect the cable from the brake arm. (Fig. 4–2, 4–3)

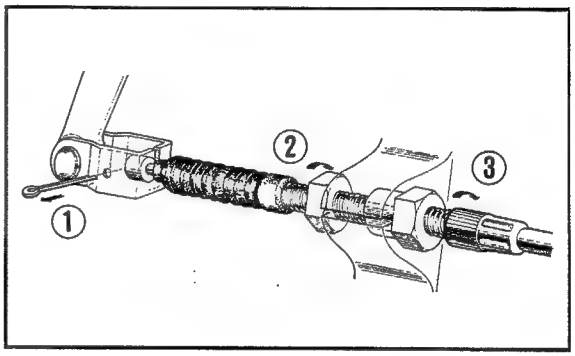


Fig. 4–2. Removing brake cable

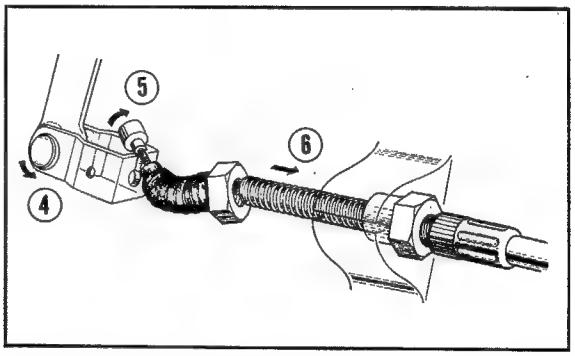
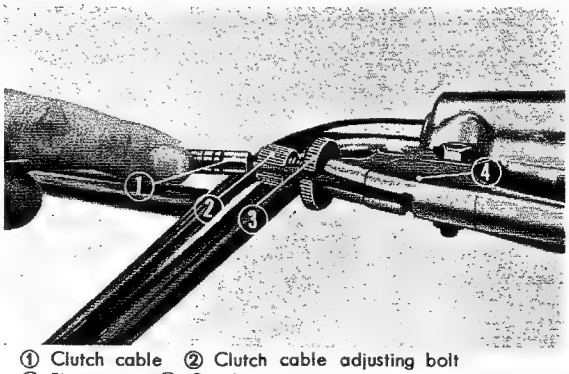


Fig. 4–3. Removing brake cable

2. Remove the brake and clutch cables from the handlebar by turning the slotted ring adjusting nut so that the slots in the holder and the ring are aligned. Removed inner cable and slide the cable end off of the handle lever. (Fig. 4–4)

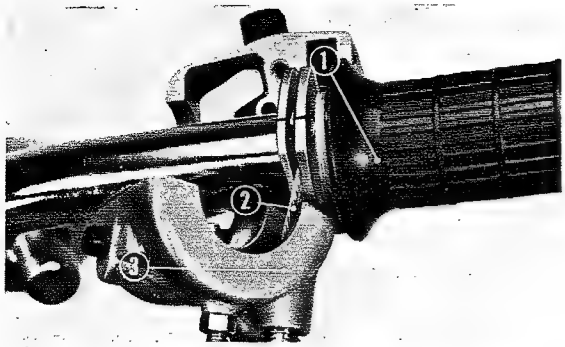
NOTE :

When disconnecting the clutch cable at the lower end, remove the gear shift pedal, drive chain cover, and then remove the cable end from clutch cable thread.



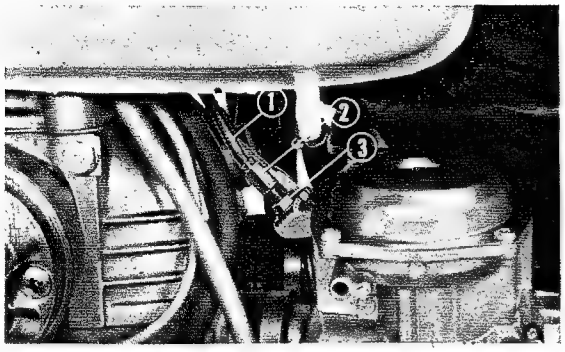
① Clutch cable ② Clutch cable adjusting bolt
③ Fixing nut ④ Clutch lever

Fig. 4–4. Removing cable from the handle



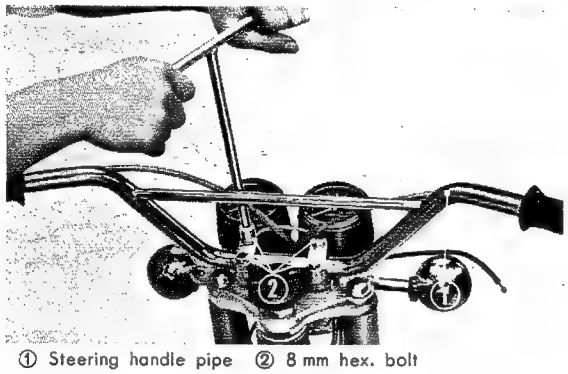
① Throttle grip ② Throttle cable
③ Starter lighting switch assembly
Fig. 4–5. Removing the throttle cable

3. To remove throttle cable from the handle lever, unscrew the setting screw on the starter switch assembly and separate the two halves of the starter switch. The starter cable will be exposed and can be removed from throttle grip pipe. (Fig. 4–5)



① Throttle cable ② Throttle cable adjuster ③ Lock nut
Fig. 4–6. Removing the throttle cable

4. Disconnect the throttle cable at the lower end by loosening the cable setting nut at the cable support arm on the carburetor and then disconnect the throttle cable from the carburetor. (Fig. 4–6)



① Steering handle pipe ② 8 mm hex. bolt
Fig. 4–7 Removing the handlebar

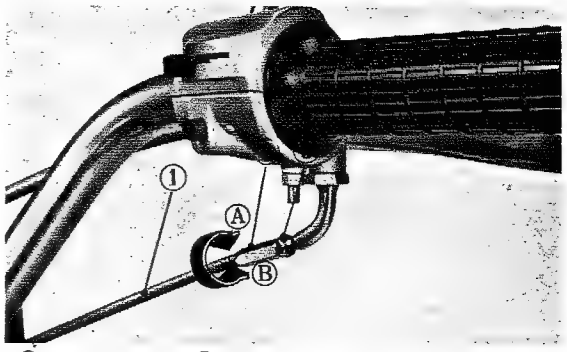
5. The electrical wiring for the horn, starting motor switch and the light dimmer switch can be disconnect by uncoupling the cable junctions from the wire harness located within headlight case.
6. Remove handlebar by unscrewing the four 8 mm bolts from the handle pipe holder clamps. (Fig. 4–7)

C. Inspection

1. Inspect the throttle, clutch, and front brake cable for damages to the housing and inner cable, also check to see that the cable is operating smoothly. Apply grease before reassembly.
2. Check the operation of the throttle grip; make sure that the action of the grip is smooth through the entire range.
3. Inspect the hand lever operation for lightness.
4. Inspect the handle pipe for twist, bends or other damages.
5. Inspect the switches on the handle for proper operation and also the lead wires for breaks and frayed covering.

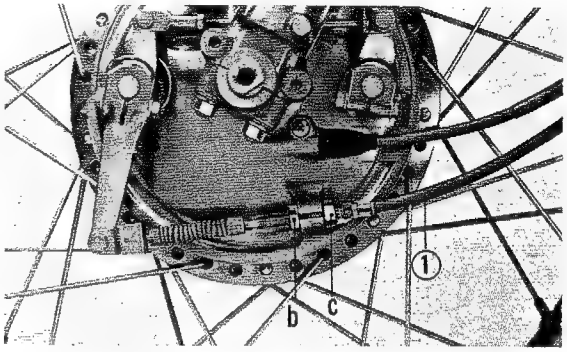
D. Reassembly

1. Route the electrical leads from the handlebar through the center hole in the top bridge and mount the handle on the top bridge. Fix in place with the handlebar holder and lock with the four 8 mm bolts.
2. Connect the throttle cable to the throttle grip and adjust the play with the nut ②. (Fig. 4–8)



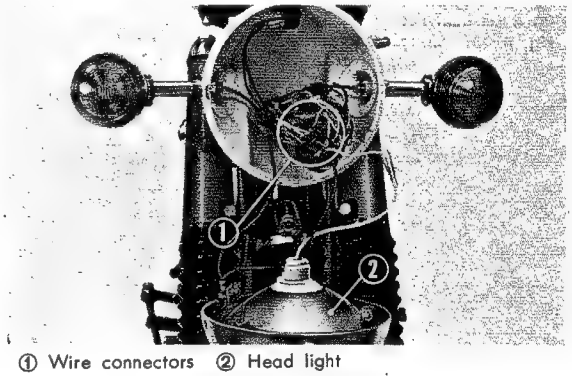
① Throttle cable ② Throttle cable adjust nut "A" ③ Lock nut Ⓐ Decrease Ⓑ Increase
Fig. 4–8. Throttle cable play adjustment

3. Connect the clutch cable to the left hand lever and the front brake cable to the right hand lever. The adjustment of the clutch cable is made at the crankcase, whereas, the adjustment for the front brake is made with nut "b" and "c" at the lower end of the front brake cable. (Fig. 4–9)



① Front brake cable
Fig. 4–9. Adjusting the front brake

4. Connect the electrical leads from the handlebar at the headlight case and then mount the headlight unit and the headlight rim. (Fig.4–10)

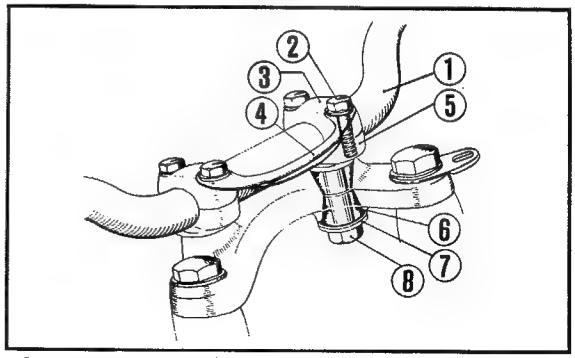


① Wire connectors ② Head light
Fig. 4–10. Joint the electrical leads

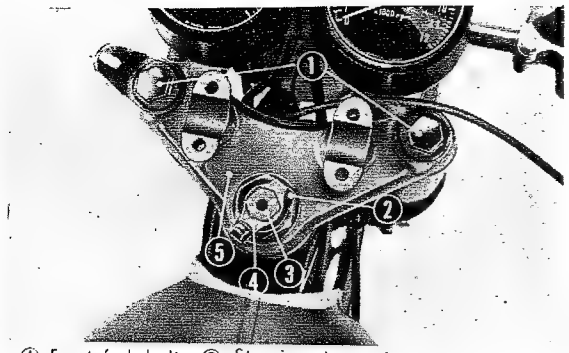
4.2 FORK TOP BRIDGE

A. Construction

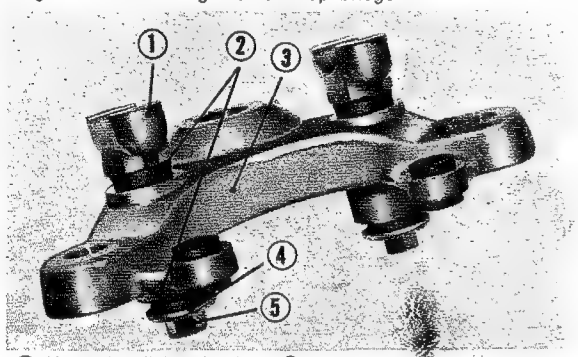
The top bridge is mounted on the front forks with two front fork bolts, the top bridge in turn is mounted to the steering stem with the steering stem nut. The handle bar is mounted to the top bridge through the handlebar cushion rubber to prevent the transmissiom of vibration from the front fork to the rider. (Fig. 4–11)



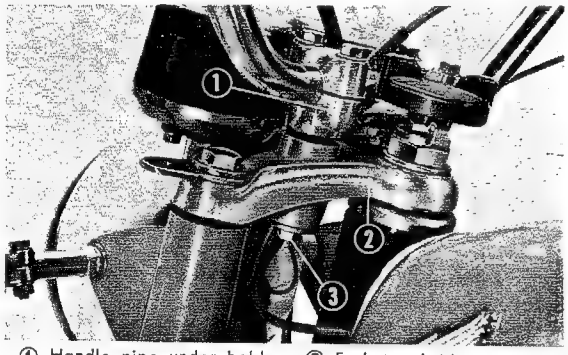
① Steering handle ② 8 mm hex. bolt ③ Handle pipe upper holder ④ Cable holder ⑤ Handle pipe under holder ⑥ Handle cushion rubber ⑦ Handle cushion washer ⑧ 8 mm hex. nut
Fig. 4–11.



① Front fork bolt ② Steering stem nut
③ Damper lock spring set bolt ④ Steering damper lock spring ⑤ Fork top bridge
Fig. 4–12. Removing the fork top bridge



① Under handlebar holder ② Handlebar cushion rubber
③ Fork top bridge ④ Handle cushion washer
⑤ 8 mm hex. nut
Fig. 4–13. Component parts of fork top bridge



① Handle pipe under holder ② Fork top bridge
③ 8 mm nut
Fig. 4–14. Top bridge holder installing 8 mm nut

B. Disassembly

1. Remove the steering handle in accordance with Section 4.1 B.
2. Extract the 6 mm lock pin and remove steering damper by pulling upward.
3. Disconnect the speedometer and the tachometer cables from the respective meters (the meters may be removed from the fork top bridge by unscrewing the 6 mm nuts).
4. Separate the fork top bridge from the fork by unscrewing the front fork bolts and loosening the steering stem nut. (Fig. 4–12)
5. Unscrew the 8 mm hex. nuts and remove the front fork washer, handle cushion rubbers and the handle pipe under holders from the fork top bridge. (Fig. 4–13)

NOTE :

If the handle pipe under holders are to be removed, it is recommended that the 8 mm hex. nut on the pipe holders be first unscrewed before removing the handlebar. This is to prevent the pipe holder from the turning. (Fig. 4–14)

C. Inspection

1. Inspect the fork top bridge for cracks and other damages.
2. Inspect the handle cushion rubber for damages and wear.

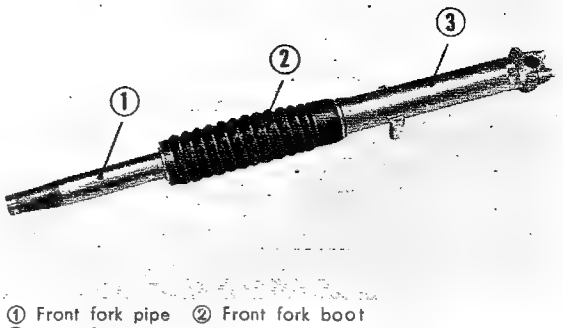
D. Reassembly

1. Mount the fork top bridge on the front fork, install the front fork bolts and steering stem nut.
2. Assemble the handlebar in accordance with Section 4.1 D above.
3. After completing the installation, check to make sure that the headlight and the turn signal light are operating properly.

4.3 FRONT CUSHION

A. Construction

The front fork must not only absorb the vertical shock caused from the road conditions but must also be able to sustain the horizontally applied force resulting from the steering function. The suspension and damping components directly influence the steering characteristics and stability of the motorcycle. The bottom case is made of aluminum to reduce the weight of the front wheel assembly. (Fig. 4-15, 16A, 16B)



① Front fork pipe ② Front fork boot
③ Front fork bottom case
Fig. 4-15. Front fork assembly

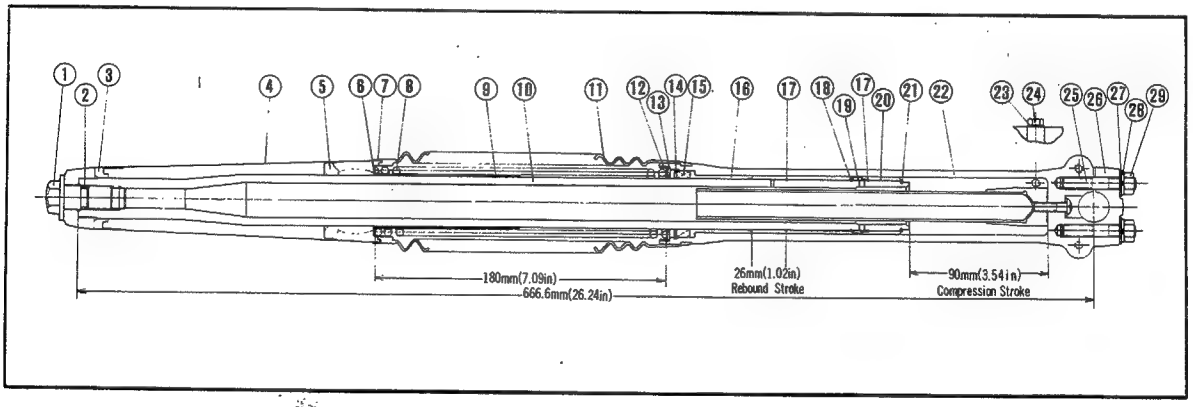
1. Operation

The front cushion of Honda 250/350 is a telescoping damper type with the externally assembled springs accepting the compressive load and the rebound extension being dampened by the hydraulic dampers. (Fig. 4-15C)

Hydraulic damper functions in the following manner.

(1) When the load of the frame is applied, the fork pipe ① attached to the piston ④ drops and compresses the oil in chamber "A".

(2) The compressed oil in chamber "A" passes to chamber "B" through the orifices "a" located around the fork pipe and lifts the valve ⑤.



① Front fork bolt ② 12 mm O ring ③ Fork cover upper cushion ④ Front fork cover ⑤ Front fork cover cushion B
⑥ Spring upper seat ⑦ Front fork rib ⑧ Front cushion spring ⑨ Front cushion spring guide ⑩ Front fork pipe complete
⑪ Front fork boot ⑫ Spring under guide ⑬ Spring under seat ⑭ 44 mm internal circlip ⑮ Oil seal
⑯ Front fork pipe guide ⑰ Piston stopper ring ⑱ Fork valve stopper ring ⑲ Front damper valve ⑳ Front fork piston
㉑ Fork piston snap ring ㉒ Front fork bottom case complete ㉓ Drain cock packing ㉔ 6×8 hex. bolt
㉕ 8×49 stud bolt ㉖ Front axle holder ㉗ 8 mm plain washer ㉘ 8 mm spring washer ㉙ 8 mm hex. nut
Fig. 4-16A. Cross-section of front cushion (CL250/350)

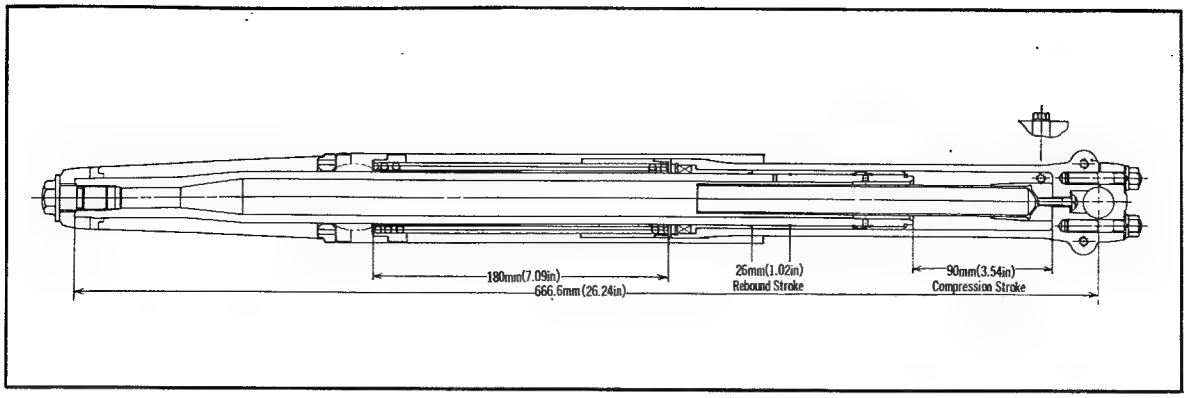
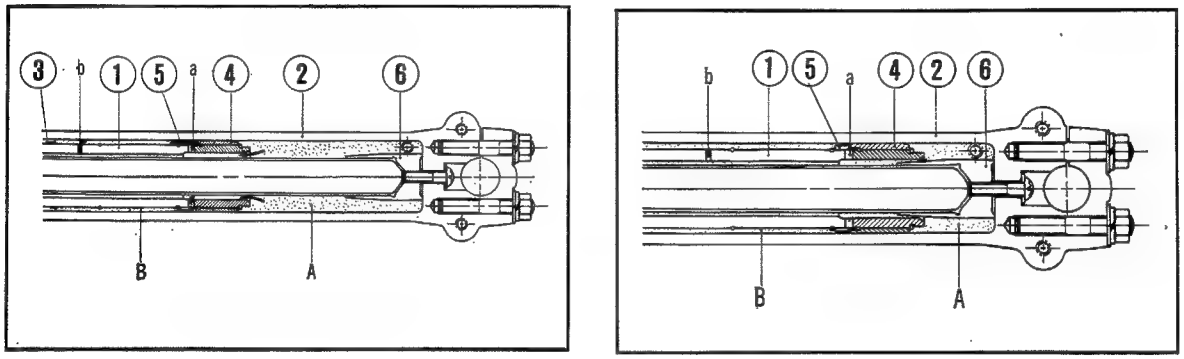


Fig. 4–16B. Cross-section of front cushion (CB250/350)



① Front fork pipe complete ② Front fork bottom case complete ③ Front fork pipe guide ④ Front fork piston
⑤ Front damper valve ⑥ Oil lock piece
Fig. 4–16C. Front cushion operation

(3) Next, the reaction from the spring causes the fork pipe ① to rise and compress the oil within chamber "B" and then passes through the orifice "b" which is designed to provide dampening and flows back to chamber "A". The viscosity of the oil produces the dampening.

When a load exceeds the capacity of the spring, the fork pipe approaches the bottom of the bottom case ②. The oil becomes sealed between the tapered lock piece ⑥ and the fork pipe to hydraulically absorb the shock.

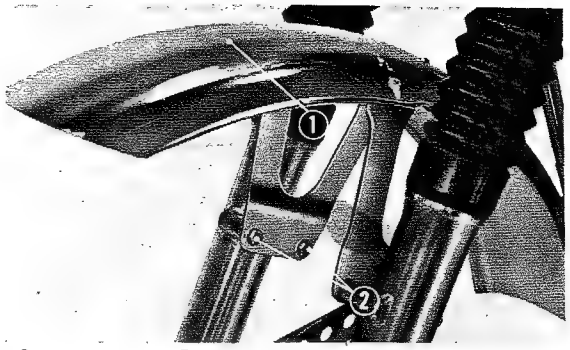
As the orifice "b" enters the guide ③, the oil becomes sealed within chamber "B" and serves as an oil lock stopper on the extension side.

- Damping force during the measured 50 mm (2 in): 30～36 kg/0.5 m/s (66.1～79.4 lb/196. 85 in/s)
- Oil capacity: 200 cc (12.2 cu. in)

Cushion rubber is inserted under the head of the front fork upper cover to absorb vibration of the headlight, reducing the shock to the headlight and speedometer, and increasing their reliability.

B. Disassembly

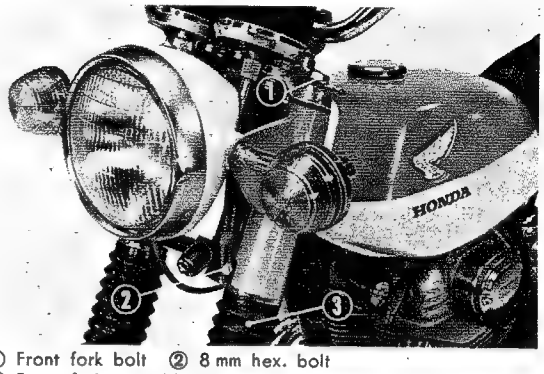
1. Separate the front wheel from the motorcycle in accordance with Section 4.13.
2. Remove the three 6 mm fender stay mounting bolts and the one 8 mm bolt (fender stay and front brake stopper arm attaching bolt) from the inside. The fender can be separated from the fork. (Fig. 4–17)



① Front fender ② 6 mm hex. bolt
Fig. 4–17. Removing the front fender

3. Unscrew the headlight case mounting bolts attaching the headlight assembly to the front fork.

Remove the 8 mm bolt from the front side of the steering stem and slide the cushion assembly out from the bottom. (Fig. 4–18)

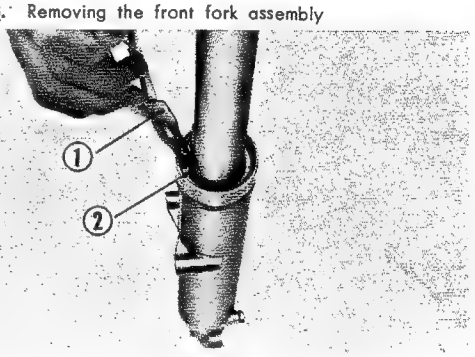


① Front fork bolt ② 8 mm hex. bolt
③ Front fork assembly
Fig. 4–18. Removing the front fork assembly

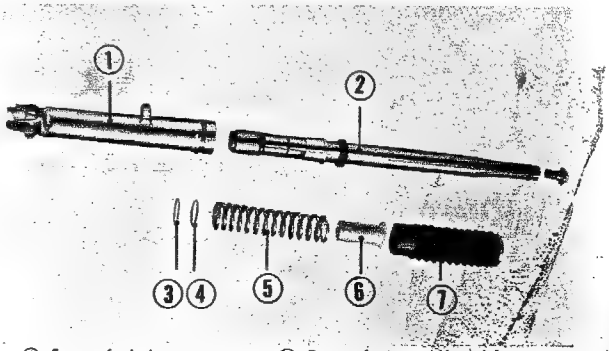
NOTE :

The front cushion removal can be facilitated by spreading the mounting ring of the bottom bridge by driving a wedge into the slot on the mounting ring.

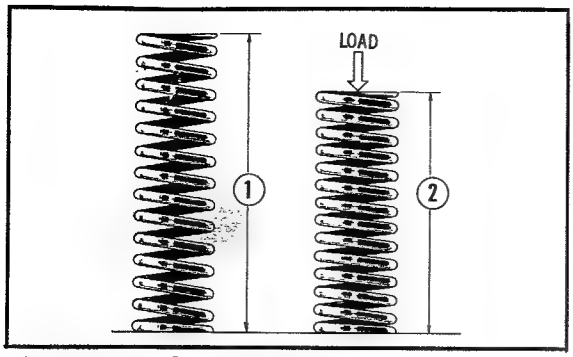
4. Drain the oil in the cushion by removing the drain plug at the bottom or inverting the cushion and draining the oil out of the top mounting bolt hole before separating the upper and lower cylinder.
5. Remove the front boot, (CB250/350: front fork under cover), front cushion spring and then remove the 44 mm internal circlip using the snap ring plier. Pull out and disassemble the front fork bottom pipe and the front fork pipe assembly. (Fig. 4–19)
6. Disassemble the front fork pipe assembly by removing the fork piston snap ring, front fork piston, stopper ring, front damper valve, front valve stopper ring, fork pipe stopper ring, and front fork pipe guide, in that order. (Fig. 4–20)



① Pliers (close) ② 44 mm internal circlip
Fig. 4–19. Removing 44 mm circlip



① Front fork bottom case ② Front fork pipe
③ 44 mm internal circlip ④ Spring under seat
⑤ Front cushion spring ⑥ Fork under cover guide
⑦ Front fork boot
Fig. 4–20. Component parts of front fork



① Free length ② Loaded length
Fig. 4-21. Front cushion spring measurement

C. Inspection

1. Front cushion spring

Item	Standard Value	Serviceable Limit
Free length	210 mm (8.27 in)	Replace when less than 196 mm (7.72 in)
Tension	135 mm/57~63 kg (5.32 in/126~139 lbs)	
	95 mm/90.2~99.8 kg (3.74 in/203~236 lbs)	
Tilt	With in 1.5°	

2. Front fork piston

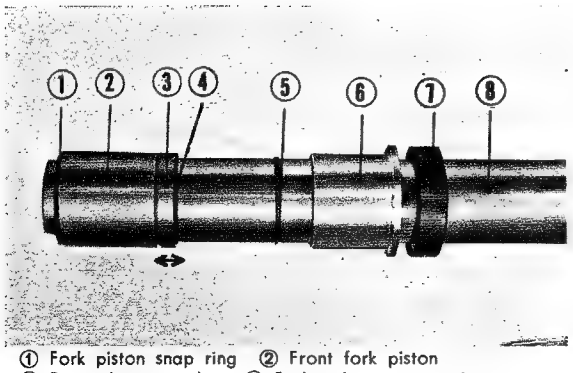
Item	Standard Value	Serviceable Limit
Out side dia.	37.395~37.420 mm (1.4722~1.4732 in)	Replace when less than 37.385 mm (1.4718 in)
Out of round	With in 0.008 mm (0.0003 in)	Replace when more than 0.01 mm (0.0004 in)
Taper	With in 0.008 mm (0.0003 in)	Replace when more than 0.01 mm (0.0004 in)

3. Front fork bottom case,

Item	Standard Value	Serviceable Limit
Inside dia.	37.50~37.539 mm (1.4764~1.4776 in)	Replace when more than 37.68 mm (1.4835 in)
Out of round	With in 0.01 mm (0.0004 in)	Replace when more than 0.03 mm (0.0012 in)
Taper	With in 0.01 mm (0.0004 in)	Replace when more than 0.03 mm (0.0012 in)

NOTE :

Particularly inspect the bottom surface of the damper valve and the upper surface of the piston for any scratches.



① Fork piston snap ring ② Front fork piston
③ Front damper valve ④ Fork valve stopper ring
⑤ Fork pipe stopper ring ⑥ Front fork pipe guide
⑦ Oil seal ⑧ Front fork pipe
Fig. 4-22. Component parts of front fork pipe

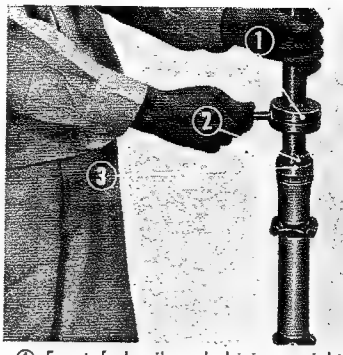
D. Reassembly

1. Clean all the part thoroughly before assembling.
2. Assemble the individual components into the front fork pipe assembly. (Fig. 4-22)

NOTE :

After completing the assembly of the front damper valve into the front fork pipe, make sure that the damper valve is operating smoothly.

3. Insert the front fork bottom pipe into the front pipe assembly using the following special tools front fork oil seal driving guide, front fork oil seal driving weight. Exercise care not to damage the oil seal. (Fig. 4–23)



① Front fork oil seal driving weight
② Front fork oil seal driving guide ③ Oil seal

Fig. 4–23. Driving oil seal

4. Assemble the front cushion spring and the boot (CB250/350 : front fork under cover).
5. Install the front cushion assembly on the steering stem. Fill each cushion with 200 cc (12.2 cu. in) of hydraulic fluid through from the front fork bolt hole and install the front fork bolt upon completing the filling. Lock the cushion at the bottom bridge by tightening the 8 mm hex. bolts. (Fig. 4–24)

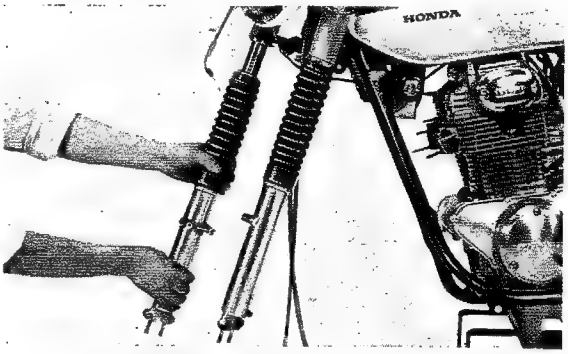
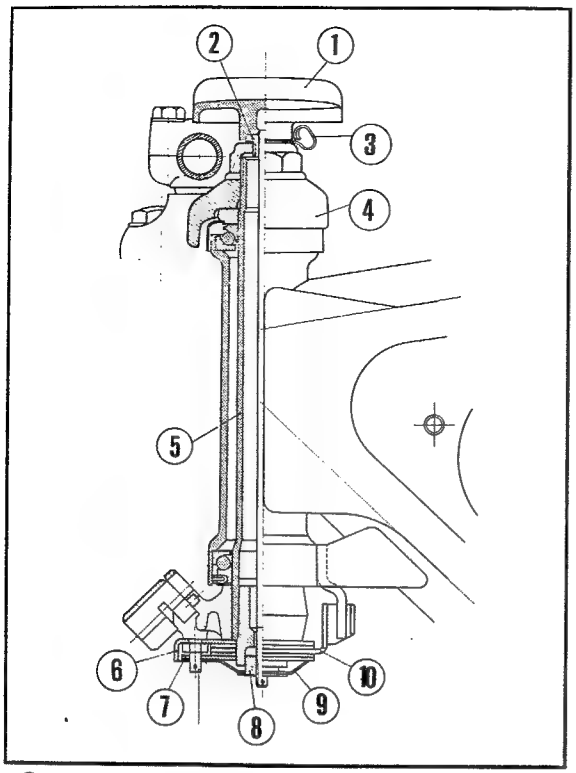


Fig. 4–24. Installing the front fork into the steering

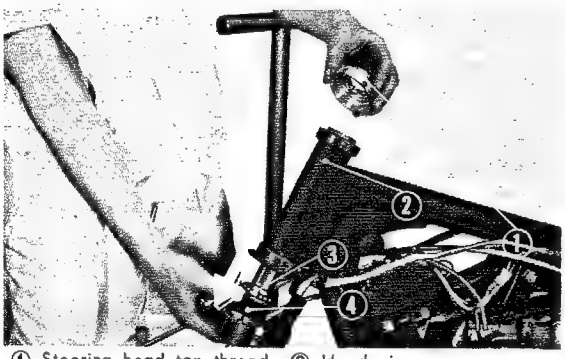
NOTE :

Hydraulic fluid grade : 10W30

6. Install the front fender and the front wheel.
7. Upon completion of the front cushion assembly, check for proper operation and assure that there is no binding.



① Steering damper knob ② Damper lock spring setting bolt
③ Steering damper lock spring ④ Front fork top bridge
⑤ Steering stem ⑥ Steering damper plate A
⑦ Steering damper plate B ⑧ Steering damper spring nut
⑨ Steering damper spring ⑩ Steering damper friction disc
Fig. 4–25. Sectional view of steering stem



① Steering head top thread ② Head pipe
③ #8 steel balls ④ Steering stem
Fig. 4–26. Removing the steering stem

4.4 STEERING STEM

A. Construction

The steering stem is mounted to the front fork by bolt through the fork top bridge. The steering stem is mounted to the frame head pipe and pivots on the upper and lower sets of the ball bearings. It is equipped with steering damper to provide adjustment of the steering stem. The steering stem can be adjusted for any type of riding or road conditions. If the steering damper knob is turned clockwise, force supplied to the friction disc causes the steering to become tight. If the steering damper knob is turned counter clockwise, a tension of the damper spring is relieved, providing less friction between damper plates. The handle bar lock consists of a lock unit and support unit combined with the steering stem. (Fig. 4–25)

B. Disassembly

1. Separate the handle in accordance with Section 4.1 B.
2. Remove the front wheel in accordance with Section 4.13 B.
3. Disassemble front cushion in accordance with Section 4.3 B.
4. Remove the top bridge plate in accordance with Section 4.2 B.
5. With the turn signal lamps remaining mounted on the headlight case, remove the upper cover and lower cover of other fork.
6. Remove the steering stem top thread and withdraw steering stem out of the head pipe, being careful not to drop the steel balls. (Fig. 4–26)

C. Inspection

1. Inspect steel balls for cracks, wear and other damages.
2. Inspect the cone and ball races of both the top and bottom for any wear or damages.
3. Inspect the steering head dust seal for wear and damages.
4. Inspect the top end of steering stem for damaged threads.
5. Check the steering damper fixing disc for wear.
6. Inspect steering handle lock for damages or defects.

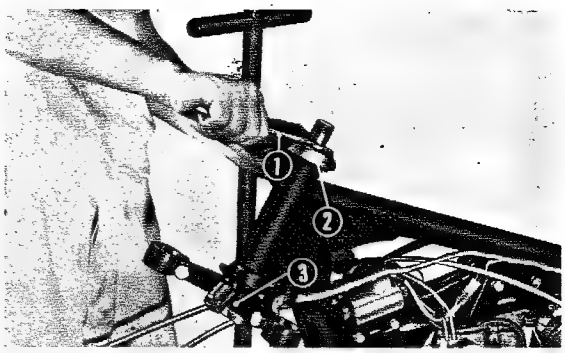
D. Reassembly

1. Mount the steering handle lock on the steering stem.
2. Mix the 1/4″ steel balls (37) in grease, lay into the lower (19) and upper (18) ball races, and carefully insert the stem into the head pipe, exercising care not to drop the balls. Tighten the steering head top thread. (Fig. 4–27)

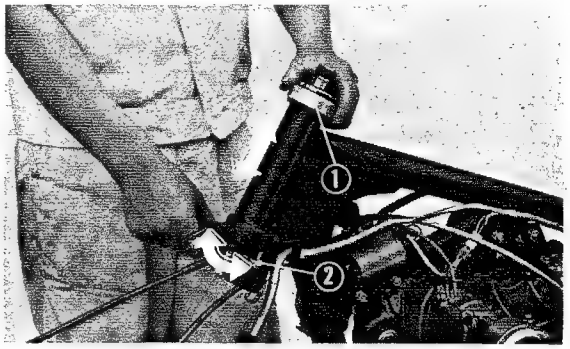
NOTE :

Special attention is required to tighten the top thread. It must be tightened in conjuction with the steering stem nut and the front fork bolt. If the stem nut is properly tightened, the steering assembly will turn to the locks under its own weigh assisted only by a slight initial force. Further there should not be any looseness of the stem in either the vertical or the horizontal directions. (Fig. 4–28)

3. Assemble the top bridge front cushion and front wheel.
4. Install the steering handle and damper knob.
5. Adjust the play of the clutch, brake and throttle cable.



① 48 mm pin spanner ② Steering head top thread
③ Steering stem
Fig. 4–27. Reassembling the steering stem



① Steering head top thread ② Steering stem
Fig. 4–28. Check of stem operation

4.5 FUEL TANK

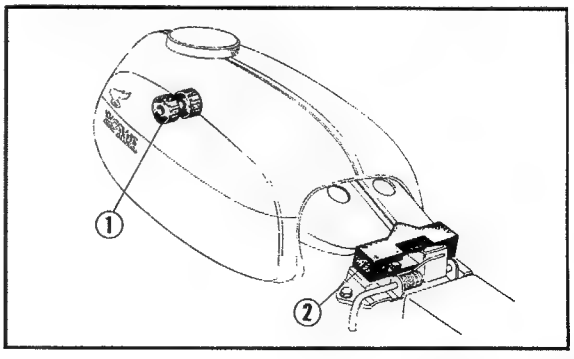
A. Construction

The fuel tank is placed on the frame body directly above the engine and is installed on the frame body through the fuel tank cushions.

Fuel tank emblem is mounted on both sides of the fuel tank.

(Knee grip rubber are also installed on the CB250/350.) (Fig. 4–29, 30)

Fig. 4–29. Fuel tank



① Fuel tank front cushion ② Fuel tank rear cushion
Fig. 4–30. Schematic view of tank rubber cushion

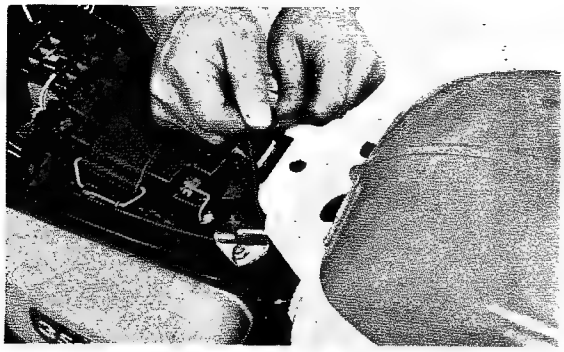
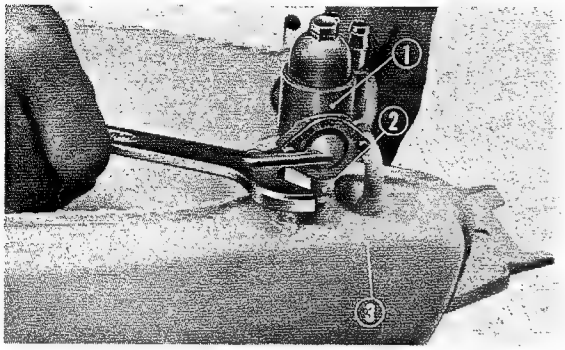
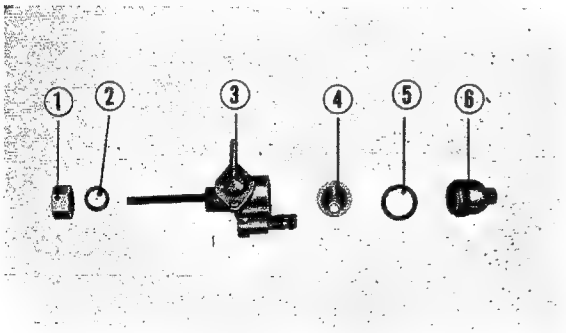


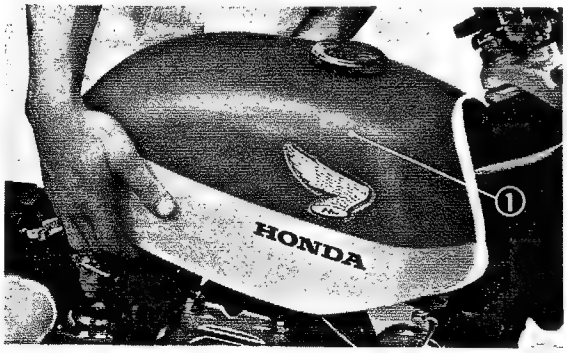
Fig. 4-31. Removing the fuel tank



① Fuel cock assembly ② Joint nut ③ Fuel tank
Fig. 4-32. Removing the fuel cock assembly



① Joint nut ② Joint nut packing ③ Fuel cock body
④ Screen ⑤ Cock packing ⑥ Fuel strainer cup
Fig. 4-33. Component parts of fuel strainer



① Fuel tank
Fig. 4-34. Installing the fuel tank

B. Disassembly

1. Unlock the seat latch located on the left front of the seat side.
2. Position the fuel cock lever to STOP position and remove the fuel tube from the fuel cock.
3. Remove one end of the fuel level tube and apply a clip on the tube to close off the fuel tube. Install a rubber cap or a plug on the tank fitting to prevent the fuel from draining. Detach fuel tank from the fuel tank rear cushion and carefully remove to the rear side. (Fig. 4-31)
4. The fuel cock assembly can be removed from the tank by loosening the joint nut and unscrewing the fuel cock assembly. (Fig. 4-32)

C. Inspection

1. Inspect the fuel tank for leaks.

NOTE :

Normally an air pressure test is performed by immersing the tank in water. However, exercise precaution since excessive pressure will cause rupture at the tank seam.

2. Inspect for clogging of the filler cap vent hole.
3. Inspect the front and rear cushion rubbers for deterioration, wear and other damages.
4. Inspect for damage to the valve cock O-ring, and the filler cap gasket. (Fig. 4-33)
5. Inspect the fuel line for defects.

D. Reassembly

1. Install the fuel cock assembly on the tank.
2. Fit the front and rear rubber cushions to the frame body. The front rubber cushion should be inserted by pushing the fuel tank from the rear. Install the fuel tank rear bracket on the rear cushion. (Fig. 4-34)

NOTE :

When installing the tank, particular attention should be given to the condition of the wires and their routing.

3. Install the two fuel lines using fuel line clips, also connect the fuel level tube to the tank valve.
4. Install the seat and secure with the seat latch.

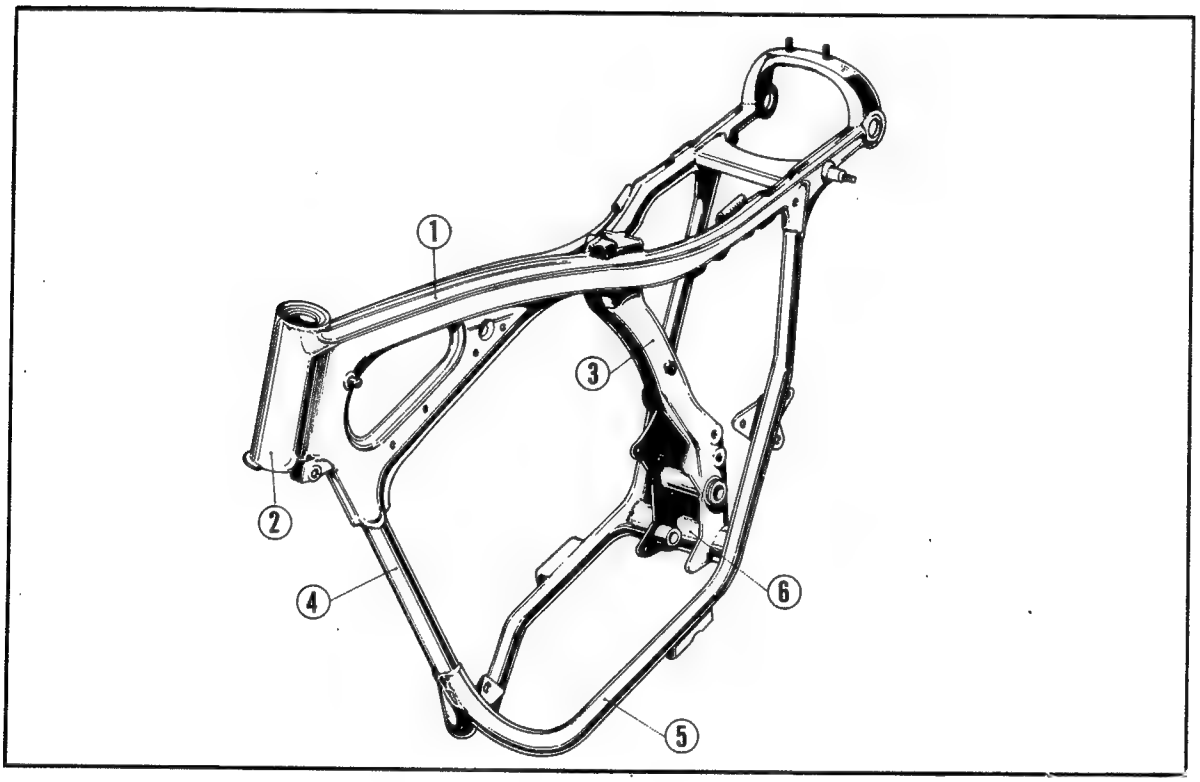
4.6 FRAME BODY

A. Construction

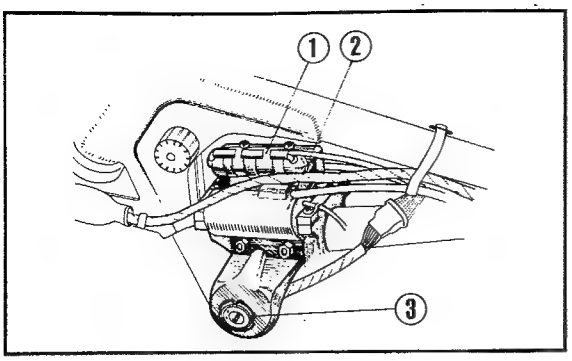
The frame body is the main structural member around which the motorcycle is assembled. It mounts the engine and is supported on the front and rear wheels. The frame is made sturdy to support the weight of the engine, rider and carrier load; in addition, it must be substantial to receive the dynamic reaction imposed by the road and riding conditions while carrying a full load.

The frame must be rigid to provide good steering characteristic and at the same time lightness and flexibility are desirable for ease of handling and for good riding performance.

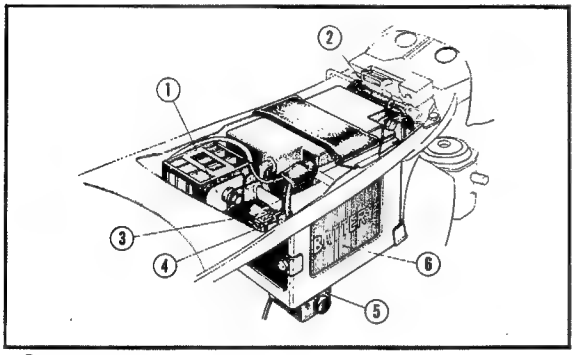
Honda 250/350 employs a semi-cradle double frame of high strength steel tubing. This type of frame is both light and flexible. Combining the front guard frame type rear fork in single unit, further increases the flexibility of the frame. (Fig. 4–35)



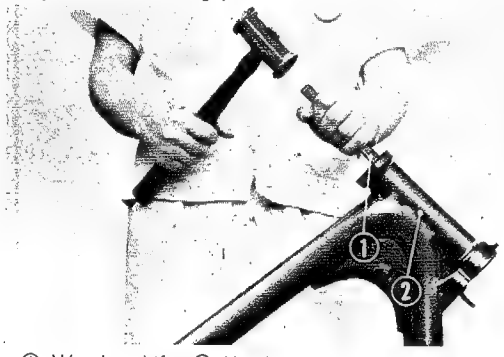
① Half frame ② Head pipe ③ Half pillar ④ Front down tube ⑤ Sub tube holder ⑥ Lower cross member
Fig. 4–35. Schematic view of frame body



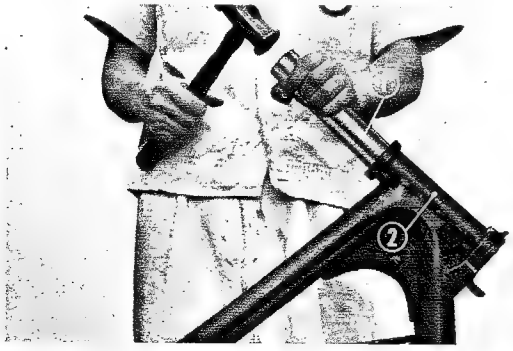
① Condenser ② Ignition coil ③ Ignition switch
Fig. 4–36. Mounting positions of electrical items



① Selenium rectifier ② Fuse ③ Magnetic starter switch
④ Winker relay ⑤ Pointless regulator ⑥ Battery
Fig. 4–37. Mounting positions of electrical items



① Wooden drift ② Head pipe
Fig. 4–38. Removing the ball race



① Ball race driving tool ② Head pipe
Fig. 4–39. Driving the ball race

B. Disassembly

1. Remove the seat and fuel tank in accordance with Sections 4.7 B and 3.4 B.
2. Remove the air cleaner in accordance with Section 4.10 B.
3. Separate the handle bar in accordance with Section 4.1 B.
4. Dismount the engine from the frame in accordance with Section 3.1 B.
5. Disassemble the front wheel in accordance with Section 4.13 B.
6. Disassemble the front cushion in accordance with Section 4.3 B.
7. Remove the top bridge in accordance with Section 4.2 B.
8. Remove the steering stem in accordance with Section 4.4 B.
9. Disassemble rear fork, rear fender and tool box in accordance with Section 4.11 B.
10. Remove the electric equipment from the frame body (see Fig. 4–36, 4–37).
11. Detached the main stand accordance with Section 4.8 B and then the frame can be disassembled.
12. Knock out the ball races from the head pipe by using a wooden drift. (Fig. 4–38)

C. Inspection

1. Inspect the weld joints for any breaks or cracks.
2. Inspect the steering head pipe for twist, bends and misalignment.
3. Inspect the top and bottom steering head ball races for signs of wear and scratches.

NOTE :

The ball races should be fitted to the steering head pipe with light driving and must be bottomed squarely. (Fig. 4–39)

4. Inspect the frame paint coating for any chips and rust spots.

D. Reassembly

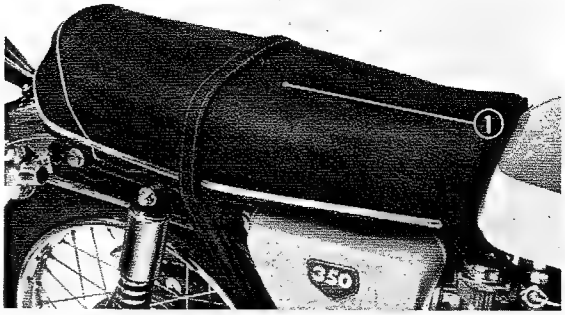
Perform the assembly in the reverse order of disassembly.

4.7 SEAT

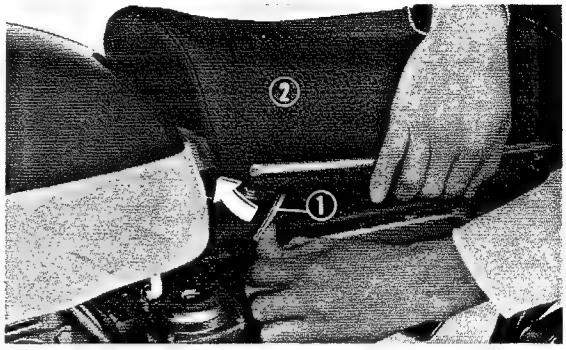
A. Construction

The motorcycle is equipped with a double seat consisting of 4 layers of sponge rubber padding to isolate the vibration from being transmitted to the rider. The rear and center sections of the seat are padded thicker to prevent the rider from sliding on the seat during sudden starting and acceleration. Seat covering is a vinyl leather for greater strength, further, it is easier to keep clean.

The inspection and replacement of the electric equipment such as the battery, selenium rectifier, magnetic starter switch and winker relay switch can be easily performed by unlatching the seat lever located at the front left side and raising the seat which is hinged at the back. (Fig. 4–40, 41)



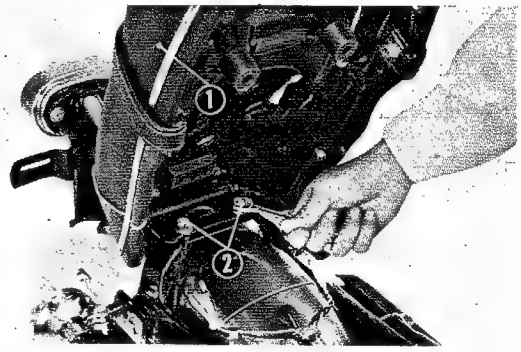
① Double seat
Fig. 4–40. Seat



① Seat latch lever ② Seat
Fig. 4–41. Unlatching the seat lever

B. Disassembly

1. Raise the seat and remove the two bolts at the seat hinge and separate seat from the frame. (Fig. 4–42)
2. The seat stay a can be separated from the seat by unscrewing the two 6 mm nuts.



① Seat ② 8 mm hex. nuts
Fig. 4–42. Removing the seat

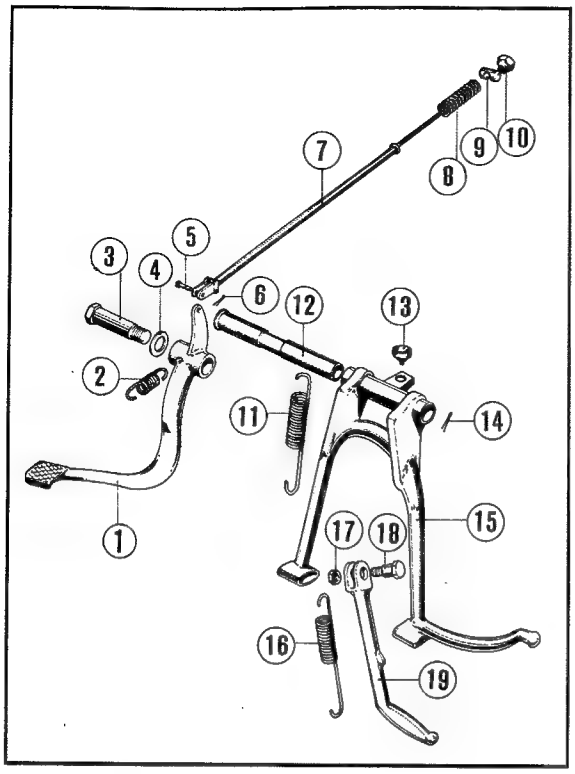
C. Inspection

1. Inspect the seat covering for wear, cracks and tear.
2. Inspect the hinge and the rubber seal to insure that they are not damaged or cracked.

D. Reassembly

1. Bolt the seat stay to the seat with the two 6 mm nuts.
2. Mount the seat hinge to the frame.
3. Assure that the seat front end is properly hooked by the latch.

Fig. 4–43 Main stand



① Brake pedal ② Brake pedal spring ③ Rear brake pivot bolt ④ 14 mm washer ⑤ Brake rod joint pin ⑥ 1.6×2 cotter pin ⑦ Rear brake rod ⑧ Rear brake rod spring ⑨ Rear brake arm joint ⑩ Rear brake adjusting nut ⑪ Main stand spring ⑫ Main stand pivot pipe ⑬ Main stand stopper rubber (CL250/350) ⑭ 2.5×30 cotter pin ⑮ Main stand ⑯ Side stand spring ⑰ 10 mm hex. nut ⑱ Side stand pivot screw ⑲ Side stand bar

Fig. 4-44. Exploded view of stand and brake pedal

4.8 STAND, BRAKE PEDAL AND STEP BAR

A. Construction

For reducing weight, a formed steel tube is used for the stand. The section which contacts the ground when the stand is erected has an oval plate welded to increase the contact area.

The brake pedal is mounted on the right side ahead of the main stand pivot pipe. (Fig. 4-43, 44)

The step bar has been designed to provide comfort to the rider. They are also made of formed steel tubing and mounted by 8mm nuts, further, it has been made easy to install and remove. (Fig. 4-45)

Fig. 4-45. Step bar

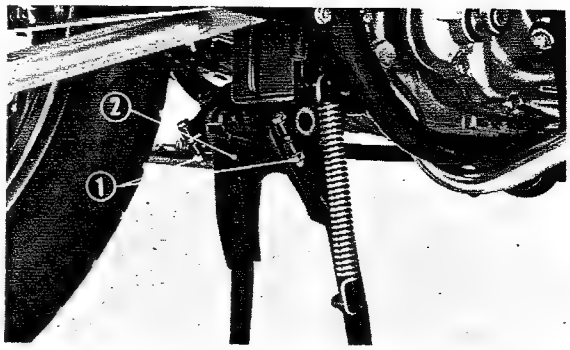
B. Disassembly

(Main Stand)

1. Raise the front wheel of the ground by placing a block underneath the engine.
2. Remove the stand spring from the right side.
3. After loosening the two 6 mm hex. nuts, remove the cotter pin from the left side, slide off the main stand pivot pipe and the remove the main stand. (Fig. 4-46)

(Brake Pedal)

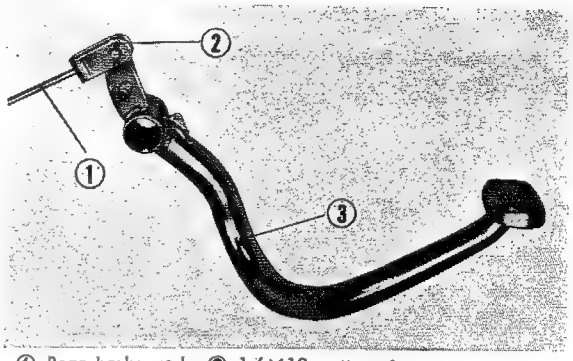
1. Remove the rear brake adjusting nut.
2. Unhook the brake pedal and stop switch springs.
3. Rear brake pedal can be removed by unscrewing the rear brake pivot bolt. (Fig. 4-47)
4. Rear brake rod can be separated from the brake pedal by removing the brake rod joint pin.



① 6 mm hex. nut ② Main stand
Fig. 4-46. Removing the main stand

(Step Bar)

1. Unscrew the four 8 mm bolts and remove the step bar. (Fig. 4-48)
2. The side stand is mounted on the left side of the step bar and is removed by disassemblying the side stand spring and side stand pivot screw.



① Rear brake rod ② 1.6×12 cotter pin
③ Rear brake pedal
Fig. 4-47. Brake pedal

C. Inspection

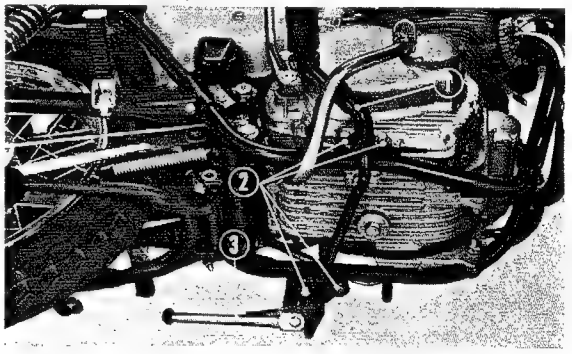
1. Check the main stand pivot pipe for damage.

Item	Standard Value	Serviceable Limit
Out side dia.	17.2～17.3 mm (0.677～0.681 in)	Replace when less than 17.15 mm (0.6751 in)

2. Check the bore of the brake pedal pivot collar hole for wear.

Item	Standard Value	Serviceable Limit
Inside dia.	14.1～14.2 mm (0.555～0.559 in)	Replace when more than 14.3 mm (0.565 in)

3. Inspect the stand, step and brake pedal to insure that they are not bent or deformed.
4. Inspect all springs for breakage or loss of tension.



① Step bar ② 8 mm bolts ③ Side stand
Fig. 4-48. Removing the step bar

D. Reassembly

1. Clean all parts and grease all shaft areas. Fill the inside of the pivot pipe with grease.
2. Perform reassembly in the reverse order of disassembly.

NOTE :

Do not over-torque the 6mm bolts. (Fig. 4-49)
Tightening torque : 80～100kg-cm (6～8ft-lb)

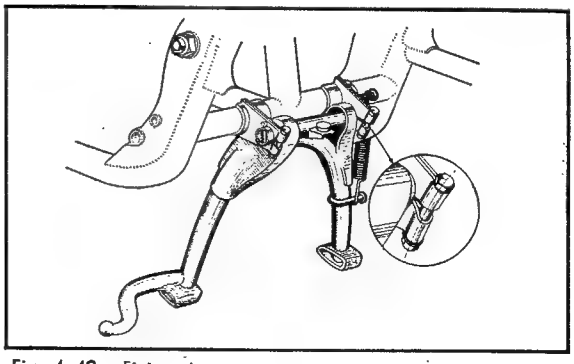
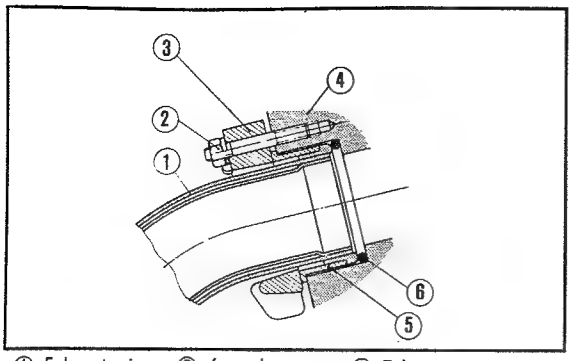
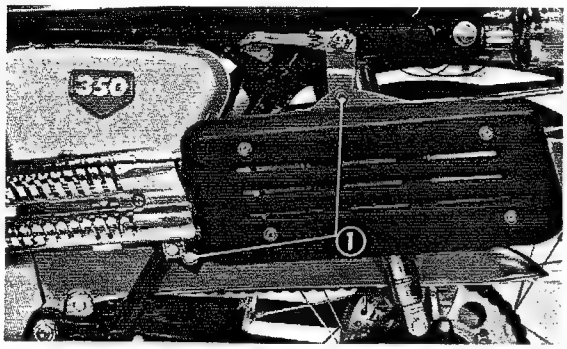


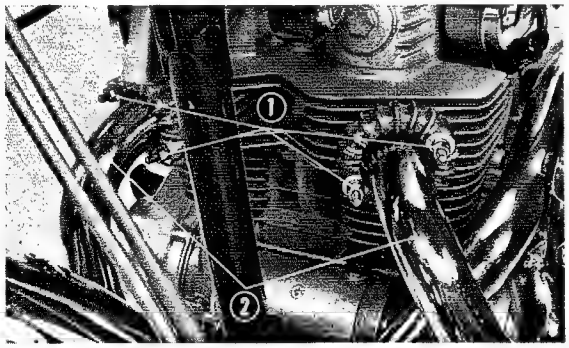
Fig. 4-49. Fixing the main stand with 6 mm bolts



① Exhaust pipe ② 6 mm hex. nut ③ Exhaust pipe joint
④ Cylinder head ⑤ Exhaust pipe joint collar
⑥ Exhaust pipe gasket
Fig. 4–50. Cross-section of exhaust pipe and nut



① 8×16 hex. bolt
Fig. 4–51. Removing the muffler



① 6 mm hex. nut ② Exhaust pipe
Fig. 4–52. Installing the exhaust pipe

4.9 MUFFLER

A. Construction

The exhaust pipe routes the exhaust gas from the cylinder head to the muffler. Pipe should have minimum of bends as this will restrict flow of the gas which will reduce the power output. Honda 250/350, exhaust pipes are constructed of double walled steel tubing to prevent the discoloration of the chrome plating. The exhaust noise is reduced as it passes through the expansion chamber, separator in the muffler. (Fig. 4–50)

B. Disassembly

Unscrew the four 6 mm exhaust pipe flange joint nuts and the two 8 mm muffler flange bolts on the left side and remove the exhaust muffler. (Fig. 4–51)

(On the CB250/350, unscrew the four 8mm muffler flange nuts on the inside of both right and left side to remove the exhaust muffler.)

C. Inspection

1. Inspect the muffler gasket for damage.
2. Inspect the muffler for cracks, dents and other defects.

D. Reassembly

1. Install the exhaust pipe gasket on the engine head and temporarily tighten the pipe joint with the collar and 6 mm nuts.
2. After completing the muffler installation, tighten the exhaust pipe flange nuts. (Fig. 4–52)

NOTE :

If the exhaust pipe flange joint nuts are tightened first, it will be difficult to install the muffler.

4.10 AIR CLEANER

A. Construction

The air cleaner filters the air which passes through the carburetor and to the cylinder. A paper filter is used in the filtering element. Honda 250/350 models utilize the compensating

filtering system where a filter element is incorporated on the right and also on the left side with inter-connecting passage. With this type of a system either one of the filter can be clogged without sacrifice to the enging performance. This is because any one of the filters will have sufficient capacity to perform the entire filtering function. This arrangement has the advantage of requiring less space and providing an affective air flow.

(Inspection and replacement of the pointless regulator can be performed by removing the air cleaner case.) (Fig. 4-53)

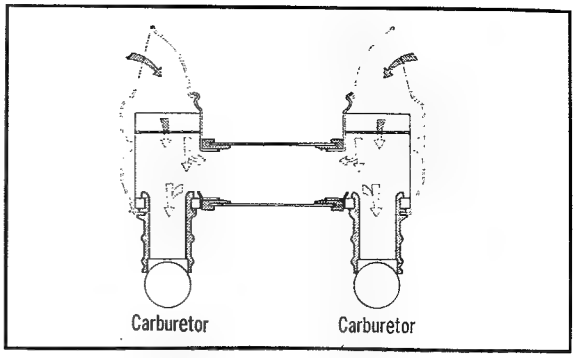


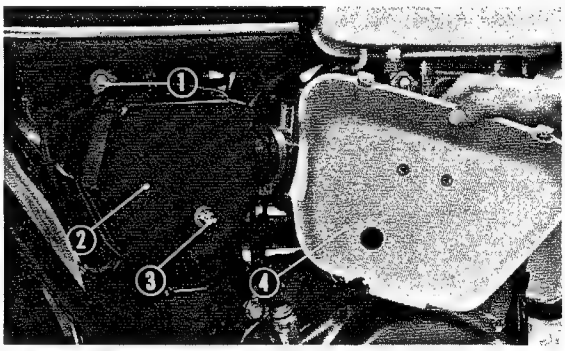
Fig. 4-53. Air flow in dual type air cleaner

B. Disassembly

1. Remove the air cleaner cover. When removing the air cleaner case from the right side of the CL250/350, the muffler must be removed first.
2. Remove the air cleaner case by removing cleaner element setting nut. (Fig. 4-54)
3. The air cleaner element can be separated from the frame by removing the air cleaner connecting tube clamp and the 6 mm bolt.

C. Inspection

1. Dust on the air cleaner element can be removed by tapping lightly and blowing off the loose dust particles with compressed air.
2. Inspect the air cleaner element to make sure that it is not damaged or clogged by soilage.
3. Also inspect the bonded section to make sure that the joints are not cracked or open.



① 6×16 hex. bolt ② Air cleaner case
③ Cleaner element setting nut ④ Air cleaner cover
Fig. 4-54. Removing the air cleaner case

D. Reassembly

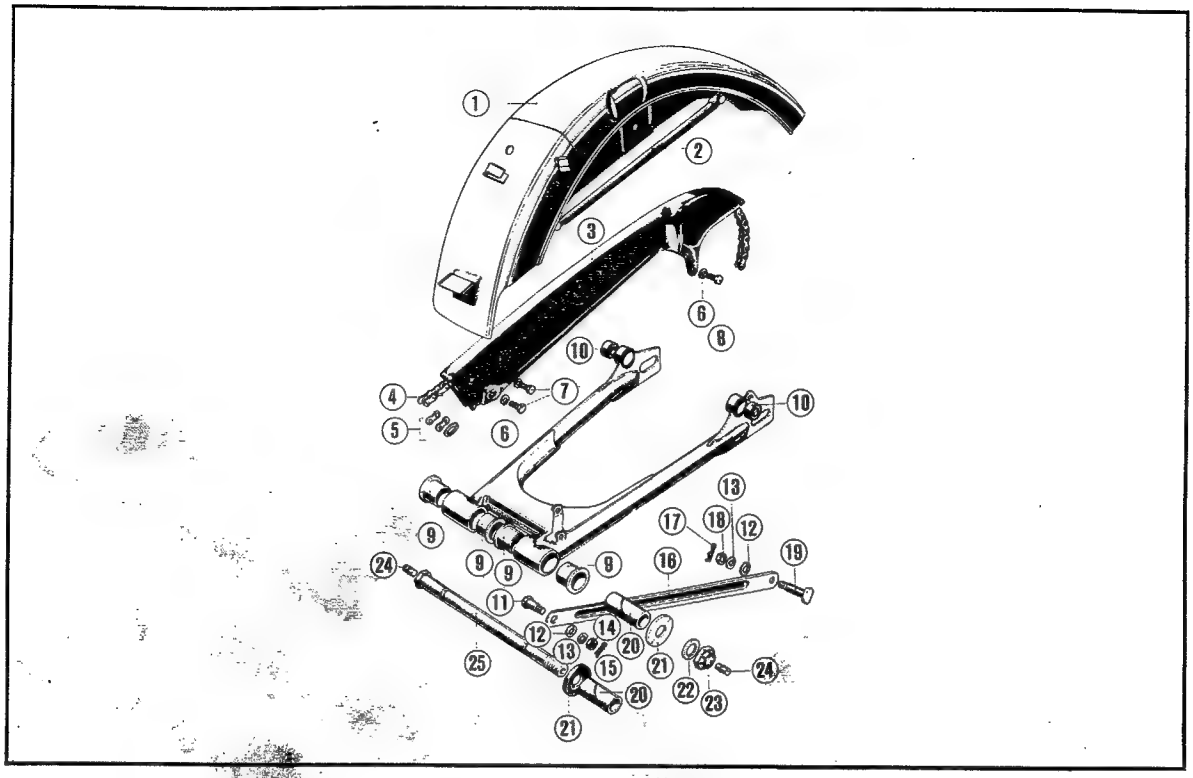
Mount the air cleaner with the 6 mm bolts, install the air cleaner connecting tube on the carburetor with the clamp.

NOTE :

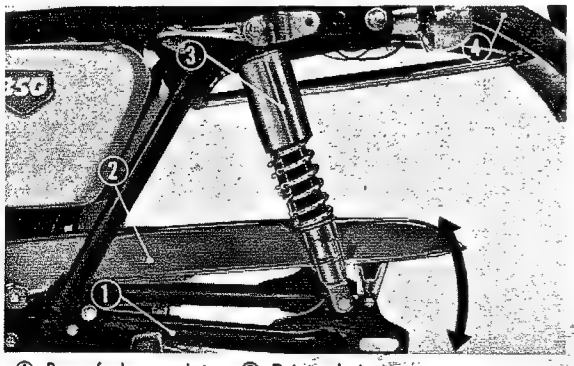
After completing the installation of the air cleaner, check to make sure that the right and left air cleaners are interconnected. If there are any leaks in the system, unfiltered air will be drawned into the cylinder and cause rapid wear to the cylinder walls.

2. Install the air cleaner case and the air cleaner cover.

4.11 REAR FORK AND REAR FENDER



① Rear fender ② Rear bamper ③ Drive chain case ④ Drive chain ⑤ Drive chain joint ⑥ 6 mm plain washer
⑦ 6×8 hex. bolt ⑧ 6×16 hex. bolt ⑨ Rear fork pivot bush ⑩ Rear cushion under bush
⑪ Rear brake stopper arm bolt ⑫ 10 mm spring washer ⑬ 8 mm plain washer ⑭ 8 mm thin nut ⑮ 2×18 cotter pin
⑯ Rear brake stopper arm ⑰ 8 mm lock pin ⑱ 8 mm hex. nut ⑲ Rear brake stopper bolt ⑳ Rear fork center collar
㉑ Rear fork dust-seal cap ㉒ 14×26 washer ㉓ 14 mm self lock nut ㉔ Grease nipple ㉕ Rear fork pivot bolt
Fig. 4–55. Exploded view of rear fork and rear fender



① Rear fork complete ② Drive chain case
③ Rear cushion assembly ④ Rear fender
Fig. 4–56. Rear fork and rear fender

A. Construction

One end of the rear fork is fitted to a section on the frame and the other end is fitted to the frame through the rear cushion. When the rear wheel moves in the vertical direction, the section which is fitted to the frame becomes the pivot point and the rear wheel moves in an arc.

The close proximity of the pivot point to the drive sprocket posses negligible effect on the chain tension. (Fig. 4–55, 56)

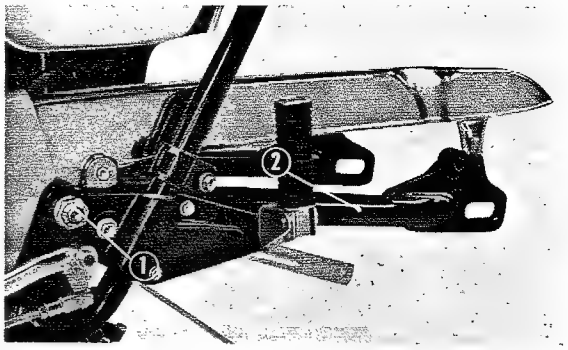
B. Disassembly

[REAR FORK]

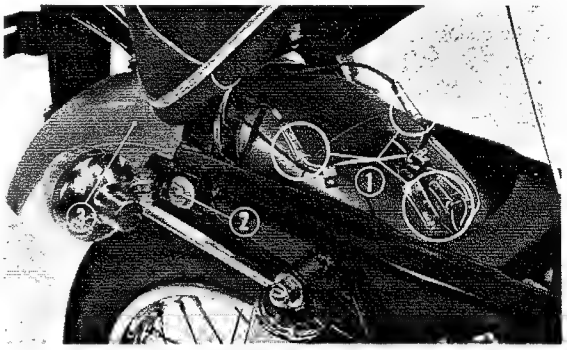
1. Remove the rear wheel in accordance with section 4. 14 B.
2. Disassemble the rear cushion in accordance with section 4.12 B.
3. Remove the 14 mm self locking nut from the rear fork pivot bolt and extract the pivot bolt; the rear fork can be separated from the frame. (Fig. 4–57)
4. Lightly tap to remove the rear fork center collar from the rear fork.
5. Separate the drive chain cover and the rear brake stopper arm from the rear fork.

[REAR FENDER]

1. Raise the seat and disconnect the wiring for both the rear winker and taillights.
2. Unscrew the two rear winker setting bolts and pull off the fender from the rear fender setting rubber. (Fig. 4–58)
3. Tool box can be separated from the frame by unscrewing the four 6 mm mounting bolts.



① 14 mm self locking nut ② Rear fork
Fig. 4–57. Removing the rear fork



① Lead connector ② Rear winker setting bolt
⑤ Rear fender
Fig. 4–58. Removing the rear fender

C. Inspection

1. Rear fork pivot bushing

Item	Standard Value	Serviceable Limit
Inside dia.	20.0~20.033 mm (0.787~0.789 in)	Replace when more than 20.18 mm (0.795 in)

2. Rear fork pivot bolts

Item	Standard Value	Serviceable Limit
Out side dia.	13.90~13.95 mm (0.547~0.567 in)	
Bending	With in 0.02 mm (0.0008 in)	Replace when more than 0.05 mm (0.002 in)

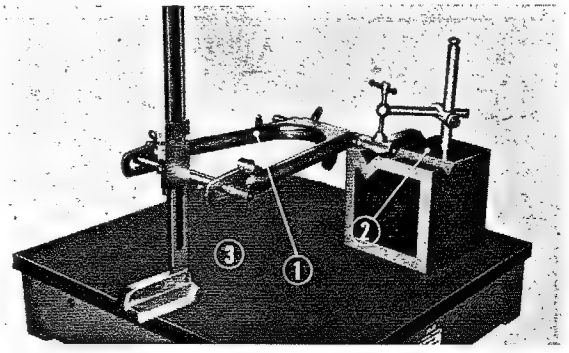
3. Rear fork (Fig. 4–59)

Item	Standard Value	Serviceable Limit
Twist	With in 0.1 mm (0.004 in)	

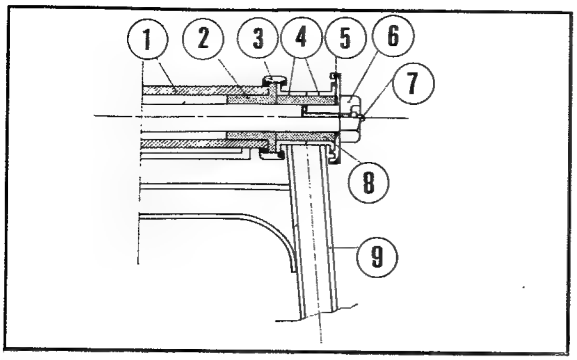
NOTE :

Measurement should be made with the rear fork pivot bushing and the center collar inserted into the rear fork.

4. Inspect the rear fender and the drive chain case for dents and other defects.



① Rear fork ② Square block ③ Surface plate
Fig. 4–59. Twist measurement of rear fork



① Frame body ② Center pipe bush
③ Rear fork dust-seal cap rubber ④ Rear fork pivot bush
⑤ Rear fork dust-seal cap ⑥ Rear fork pivot bolt
⑦ Grease nipple ⑧ Rear fork center collar
⑨ Rear fork
Fig. 4-60. Cross-section of the rear fork pivot portion

D. Reassembly

〔REAR FORK〕

1. Drive in the pivot bushing and the center collar. Insert the rear fork seal cap. (Fig. 4-60)
2. Insert the pivot bolt through the side bracket and assemble the rear fork to the frame.
3. Install the rear wheel.
4. Install the drive chain.
5. When the assembly is completed, adjust the rear brake pedal and the chain tension.
6. Install the drive chain case.

〔REAR FENDER〕

1. Perform the reassembly in the reverse order of disassembly.

4.12 REAR CUSHION

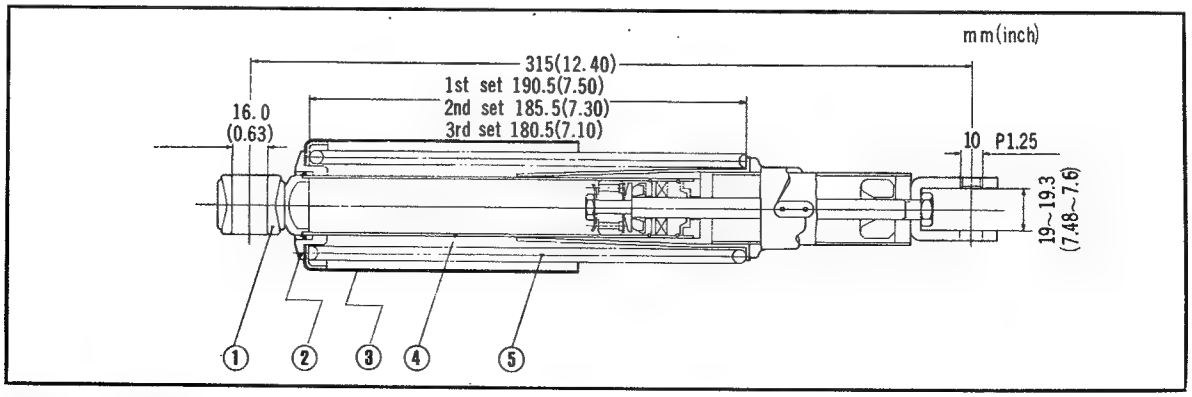
A. Construction

A Do Carbon type rear damper is employed on Honda 250/350 which is of a single cylinder double acting type in contrast to the double cylinder single acting type commonly used.

Nitrogen gas and oil are sealed within the cylinder under pressure to constantly maintain an internal pressure.

During extension and compression of the cushion, the oil flows through a small orifice in the piston in both direction to operate the valve which controls the damping for both the compression and extension. (Fig. 4-61)

Damping force :	Extension	60 kg/0.5 m/sec.	(132.3 lbs/20 in/sec.)
	Compression	15 kg/0.5 m/sec.	(33.1 lbs/20 in/sec.)



① Joint rubber ② Spring seat stopper ③ Rear cushion upper case ④ Rear damper assembly ⑤ Rear cushion spring
Fig. 4-61. Sectional view of rear cushion

Feature and Performance

a. Simple type of a construction
Due to the lack of outside tubular shell, the heat radiation is good and the oil changes are small. Therefore, the performance does not degrade.

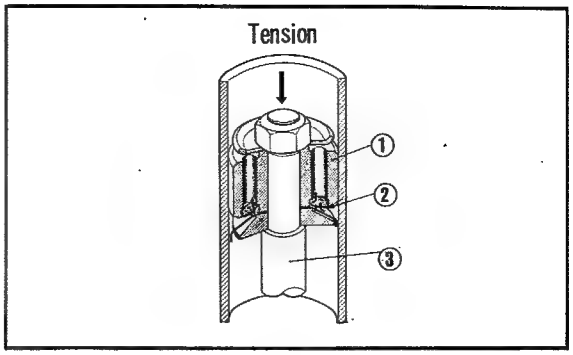
The number of parts have been reduced, simplifying the construction; minimizing valve noise and increasing its service life.

The damping force is dependent upon the piston speed; performance being especially good at low speed. Further, vibration stabilizes very quickly.

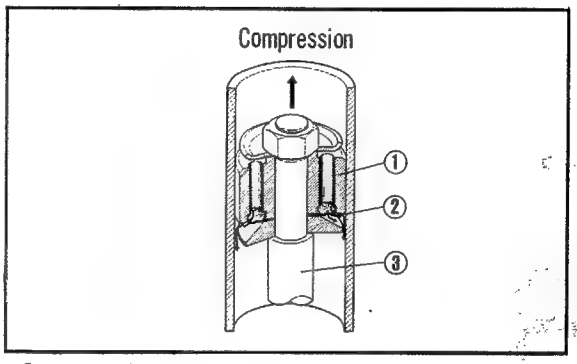
b. Internal pressure constantly maintained
Air and oil mixture will not occur; function will not deteriorate even when operated for extended period over adverse road condition.

Since the oil seal is constantly under pressure, there is no oproblem with leak; service life is greatly extended.

The differerence in pressure between the front and rear of the valve is small; since foam does not form, noise is minimized; deterioration of the damping force is prevented. (Fig. 4–62)



① Piston ② Valve ③ Rod
Fig. 4–62A.



① Piston ② Valve ③ Rod
Fig. 4–62B.

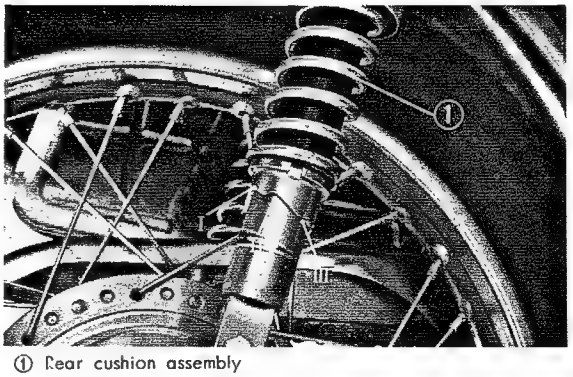
NOTE:

Do not disassemble the damper.

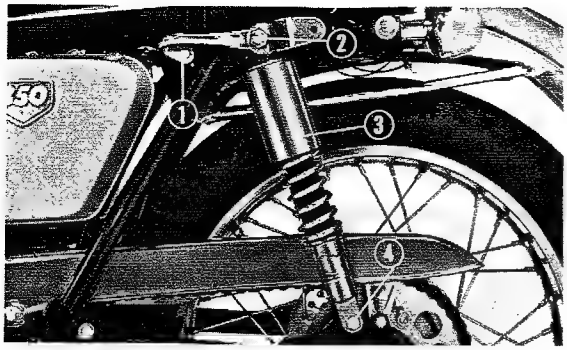
The use of pressurized nitrogen gas eliminates any hazard.

Rear suspension adjustment

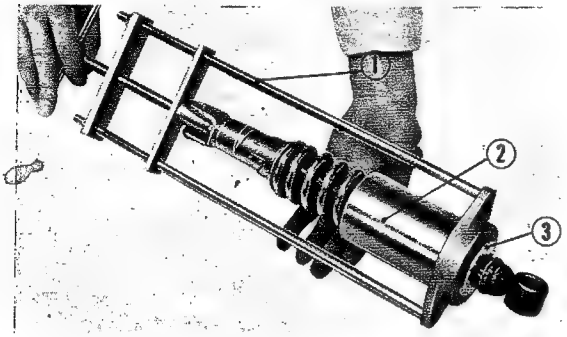
The rear cushion ① has three-range of adjustment in spring tension and is to be adjusted to meet the different type of road or riding conditions. I position is for normal riding. The damper spring strength increasing progressively from II to III, and is to be used for heavily loaded condition or when operating on bad roads. (Fig. 4–63)



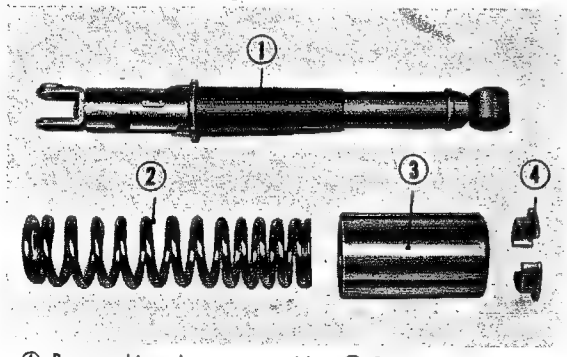
① Rear cushion assembly
Fig. 4–63. Rear cushion adjustment



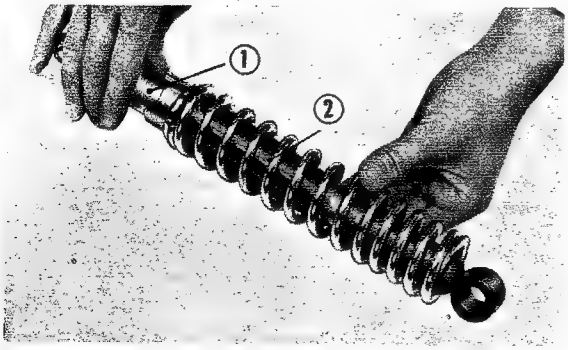
① 6 mm hex. bolt ② 10 mm hex. cap nut
③ Rear cushion assembly ④ 10 mm hex. bolt
Fig. 4-64. Removing the rear cushion assembly



① Special tool ② Rear cushion assembly
③ Spring seat stopper
Fig. 4-65. Disassembling rear cushion



① Rear cushion damper assembly ② Rear cushion spring
③ Rear cushion upper case ④ Spring seat stopper
Fig. 4-66. Component parts of rear cushion



① Rear cushion damper assembly ② Rear cushion spring
Fig. 4-67. Assembling rear cushion

B. Disassembly

1. Remove the 6 mm bolt from the forward end of the side hand hold, loosen the 10 mm cap nut, 10 mm bolt and remove the rear cushion assembly. (Fig. 4-64)

2 Compress the rear cushion upper case by using a special tool and remove the rear cushion seat, lift off the upper case and then remove the cushion spring. (Fig. 4-65)

3. Disassembly of the rear cushion damper is not necessary. (Fig. 4-66)

C. Inspection

1. Rear cushion spring

Item	Standard Value	Serviceable Limit
Free length	201.3 mm (7.925 in)	Replace when less than 175.3 mm (6.902 in)
Tension	150 mm/90.2~99.8 kg (5.906 in/ 198.89~220.06 lbs)	——
	115 mm/168~186 kg (4.528 in/ 370.44~410.13 lbs)	——
Tilt	With in 1.5°	

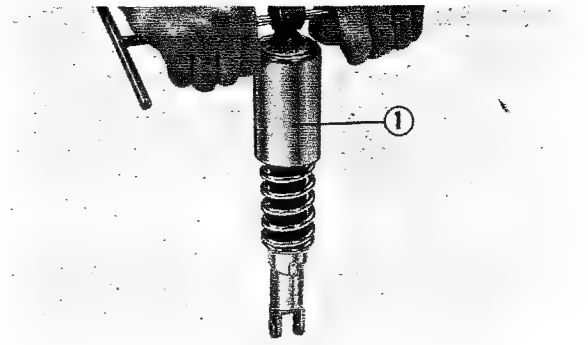
2. Inspect the cushion damper to insure that there is no fluid leakage.
3. Inspect the damper case and rod to insure that they are not damaged or deformed.
4. Inspect the rear cushion stopper to insure that it is not damaged or deformed.

D. Reassembly

1. Assemble the under seat, spring and upper case to the damper. Compress the assembly using a special tool and lock the assembly with the spring seat stopper. (Fig. 4-67)

NOTE :

- When installing the spring seat stopper, extend the cushion assembly, otherwise, difficulty will be encountered.
- Upon completing the assembly, actuate the cushion assembly by hand to make sure that they are not binding. (Fig. 4-68)

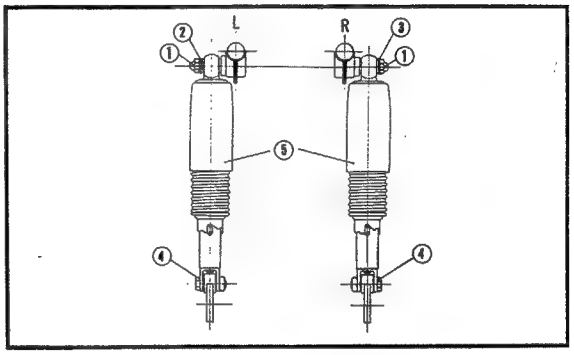


① Rear cushion assembly
Fig. 4-68. Check of cushion

2. Install the cushion in the reverse order of disassembly. (Fig. 4-69)

NOTE :

After installing the cushion, check the alignment of the right and left cushion and also the alignment of the cushion mounting bolt for both right and left sides.

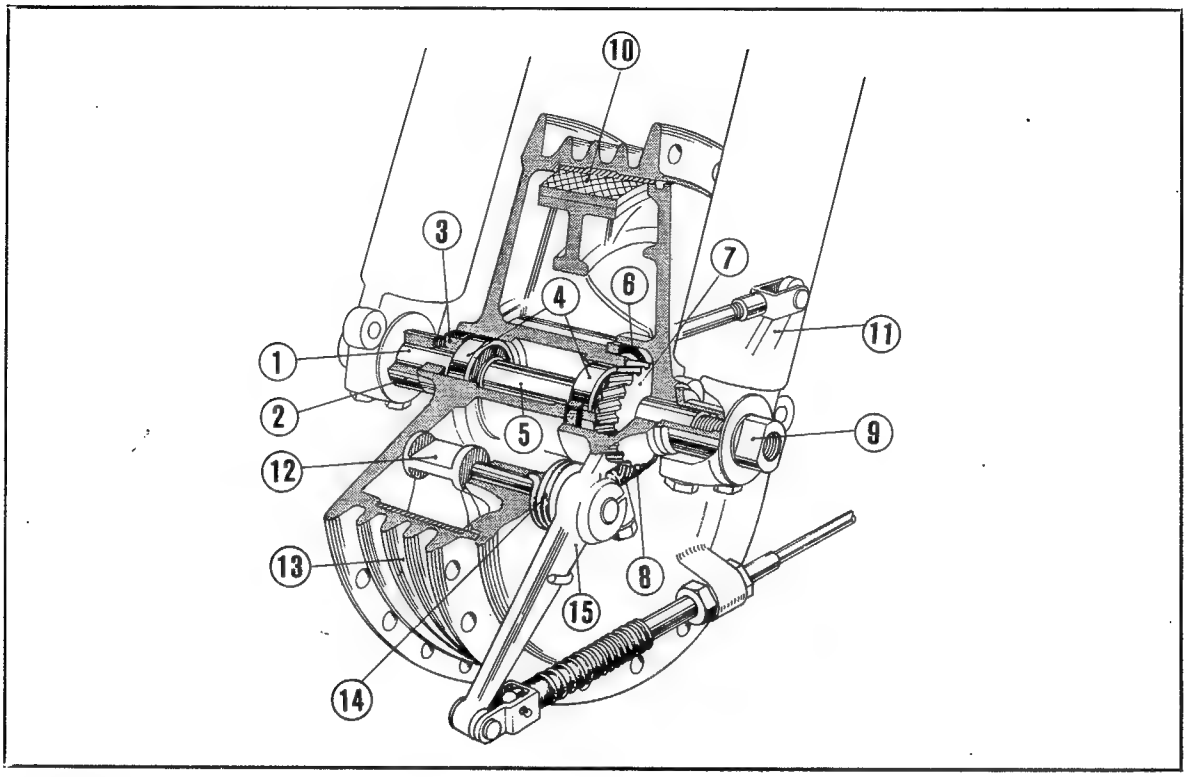


① 10 mm cap nut ② Side grip ③ Special washer
④ 10×32 hex. bolt ⑤ Rear cushion
Fig. 4-69. Mounting bolts and nuts of rear cushion

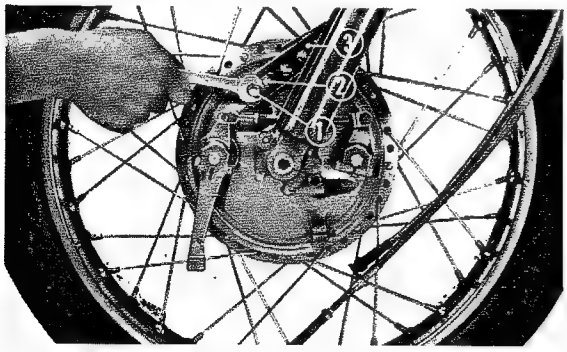
4.13 FRONT WHEEL

A. Construction

The cast aluminum hub and brake panel houses the brake assembly, front axle distance collar, two 6302R ball bearings and the speedometer gear. The reaction to the braking force is received by the brake panel stopper arm located on the left side. (Fig. 4-70)



① Front wheel axle ② Front wheel side collar ③ Oil-seal ④ 6302R ball bearing ⑤ Front axle distance collar ⑥ Oil-seal ⑦ Speedometer gear ⑧ Speedometer pinion ⑨ Front wheel axle sleeve ⑩ Front brake shoe ⑪ Front brake arm B ⑫ Front brake cam ⑬ Front wheel hub ⑭ Brake arm spring ⑮ Front brake arm A
Fig. 4-70. Cross-section of front wheel



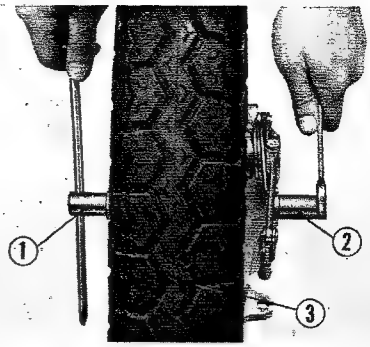
① Front brake stopper arm bolt ② 8.2 mm tongued washer ③ Front brake stopper arm
Fig. 4-71. Removing the brake stopper arm

B. Disassembly

1. Place a suitable support block under the engine to raise front wheel off the ground.
2. Disconnect the front brake cable, the speedometer cable from the speedometer gear and the brake stopper arm. (Fig. 4-71)
3. Remove the 8 mm nuts which support the lower axle holder on both the right and left sides. The wheel will then drop away from the fork.

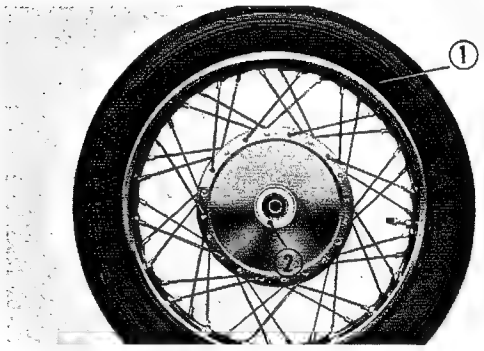
4. Insert a bar into the hole on the right side of the front wheel axle and remove the shaft on the left side with a 17 mm wrench.

   Brake panel can be separated from the front wheel. (Fig. 4–72)



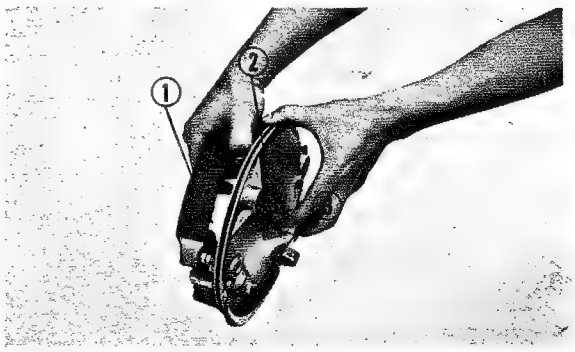
① Front wheel axle ② Front wheel axle sleeve
③ Front wheel tire
Fig. 4–72. Removing the front wheel axle

5. Remove the panel, oil seal, two 6302R ball bearings, and front axle distance collar. (Fig. 4–73)



① Front wheel tire ② Oil seal
Fig. 4–73. Removing the oil seal

6. Remove the front brake arm and pull out the front brake cam; the brake shoes can be removed from the panel by spreading the shoes apart by hand. (Fig. 4–74)
7. Separate the tire and tube from the rim with the aid of the tire iron.



① Front brake shoe ② Front brake panel
③ Front brake cam
Fig. 4–74. Removing the front brake shoe

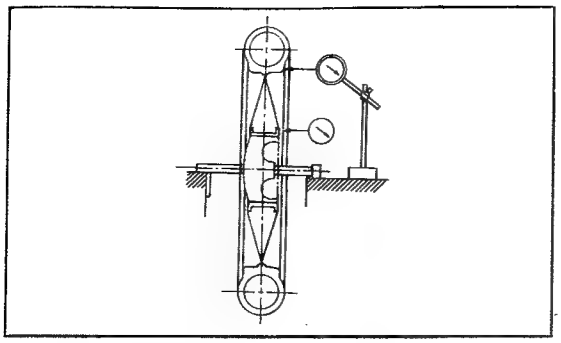
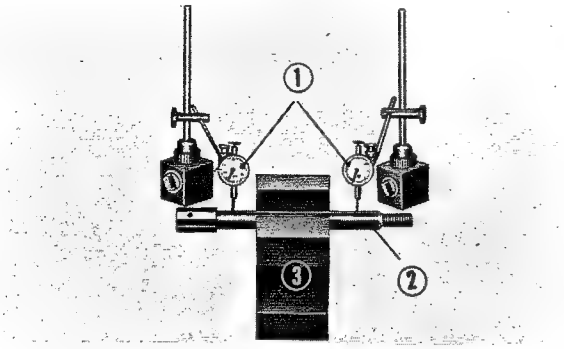
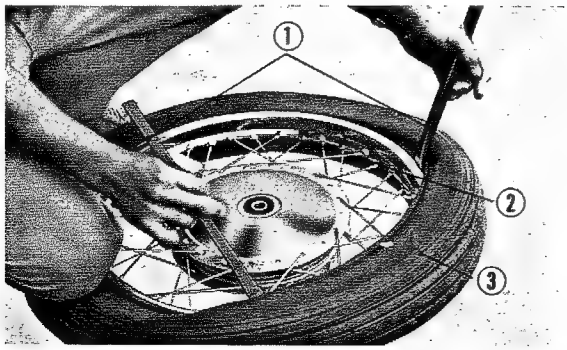


Fig. 4-75. Checking the front wheel rim for runout



① Dial gauge ② Front wheel axle ③ V-block
Fig. 4-76. Checking the front axle for bend



① Tire lever ② Front wheel rim ③ Front wheel tire
Fig. 4-77. Installing the tire

C. Inspection

1. Rim runout (Fig. 4-75)

Item	Standard Value	Serviceable Limit
Side runout	Dial runout with in 0.5 mm (0.020 in)	Replace or repair when more than 2.0 mm (0.079 in)
Vertical runout	Dial runout with in 0.5 mm (0.020 in)	Replace or repair when more than 2.0 mm (0.079 in)

2. Axle bend and wear. (Fig. 4-76)

Item	Standard Value	Serviceable Limit
Out side dia.	14.957~14.984 mm (0.589~0.590 in)	Replace when less than 14.95 mm (0.5886 in)
Bend	Within 0.05 mm (0.002 in)	

3. 6302R ball bearings axial and radial clearance.

Item	Standard Value	Serviceable Limit
Axial clearance	Not more than 0.07 mm (0.003 in)	Replace when more than 0.1 mm (0.004 in)
Radial clearance	0.003~0.018 mm (0.0001~0.0007 in)	Replace when more than 0.05 mm (0.002 in)

4. Front brake shoe diameter and lining thickness.

Item	Standard Value	Serviceable Limit
Out side dia.	181.0~181.4 mm (7.126~7.142 in)	
Thickness	5.5~5.7 mm (0.217~0.224 in)	Replace when less than 3.0 mm (0.118 in)

5. Front brake cam thickness.

Item	Standard Value	Serviceable Limit
Thickness	8 mm (0.315 in)	Replace if worn, deformed or unusual

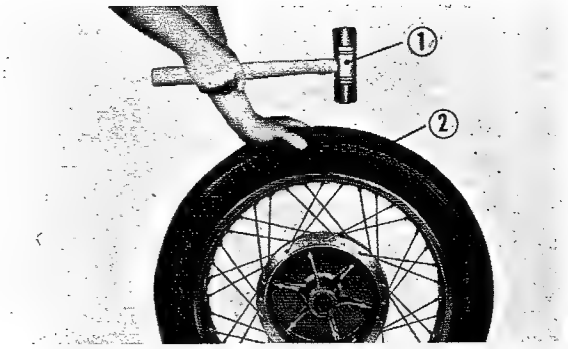
6. Inspect anchor pin for bend.
7. Inspect and tighten any loose spokes.
   Tightening torque 20~25 kg-cm (1.4~1.8 ft-lb)
8. Check for air leak by submerging the tube in water.
9. Check the tire for damage to casing, both inside and outside.
10. Balance wheel assembly.

D. Reassembly

1. The tube can be easily mounted by inflating with small amount of air to make the tube firm. (Fig 4-77)

NOTE :

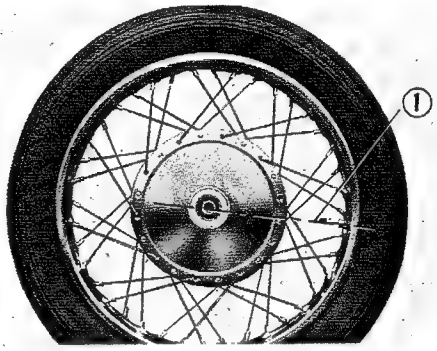
- After the tire is mounted, inflate with approximately 1/3 the designated pressure and lightly tap around the tire with a wooden hammer to eliminate any pinching of the tube. (Fig. 4-78)



① Wooden hammer ② Front wheel tire
Fig. 4-78. Tapping around the tire

- The valve stem should be positioned pointing toward the axle to prevent damage to the tube. (Fig. 4-79)
- Inflate the tire to the specified pressure.

  For normal riding : 1.8 kg/cm^2 (25.6 lbs/in^2)
  For high speed riding :
  2.0 kg/cm^2 (28.4 lbs/in^2)

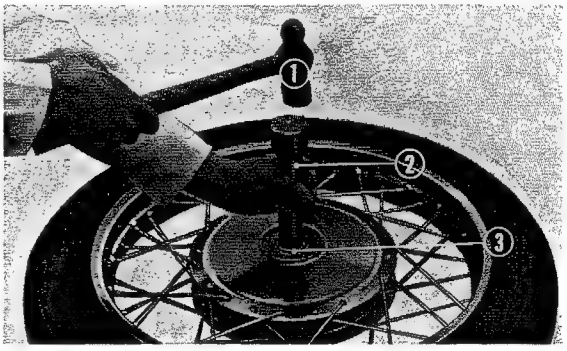


① Valve stem
Fig. 4-79. Valve angle

2. Grease the 6302R ball bearing and pack the inside of the front wheel hub with grease, and insert the spacing collar. Drive in the ball bearing using the bearing driver. (Fig. 4-80)

NOTE :

The 6302R ball bearing incorporates a seal on the outside, therefore, make sure that the bearing is not installed in the inverted position.

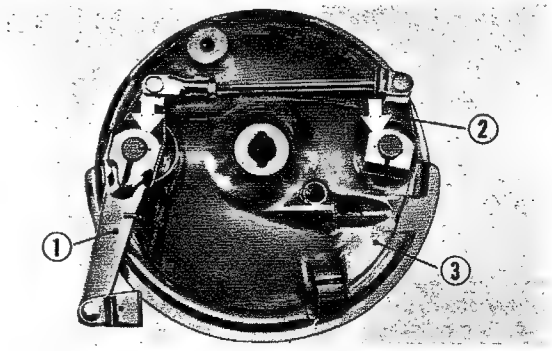


① Hammer ② Bearing driver ③ 6302R ball bearing
Fig. 4-80. Driving the bearing

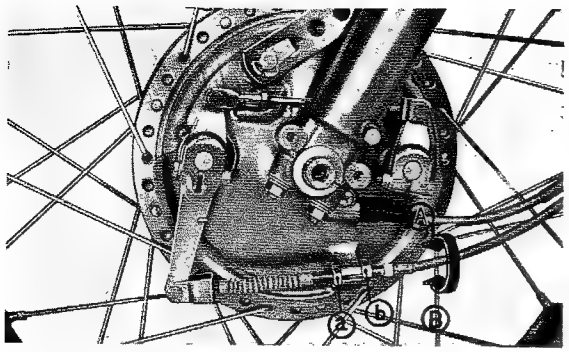
3. Hook the spring on the front brake shoe and then install the anchor pin and brake cam. Assemble the unit to the front brake panel.

NOTE :

Punch marks on the brake arm and brake cam must be aligned. (Fig. 4-81)



① Front brake arm A ② Front brake arm B
③ Front brake panel
Fig. 4-81. Installing the brake arm



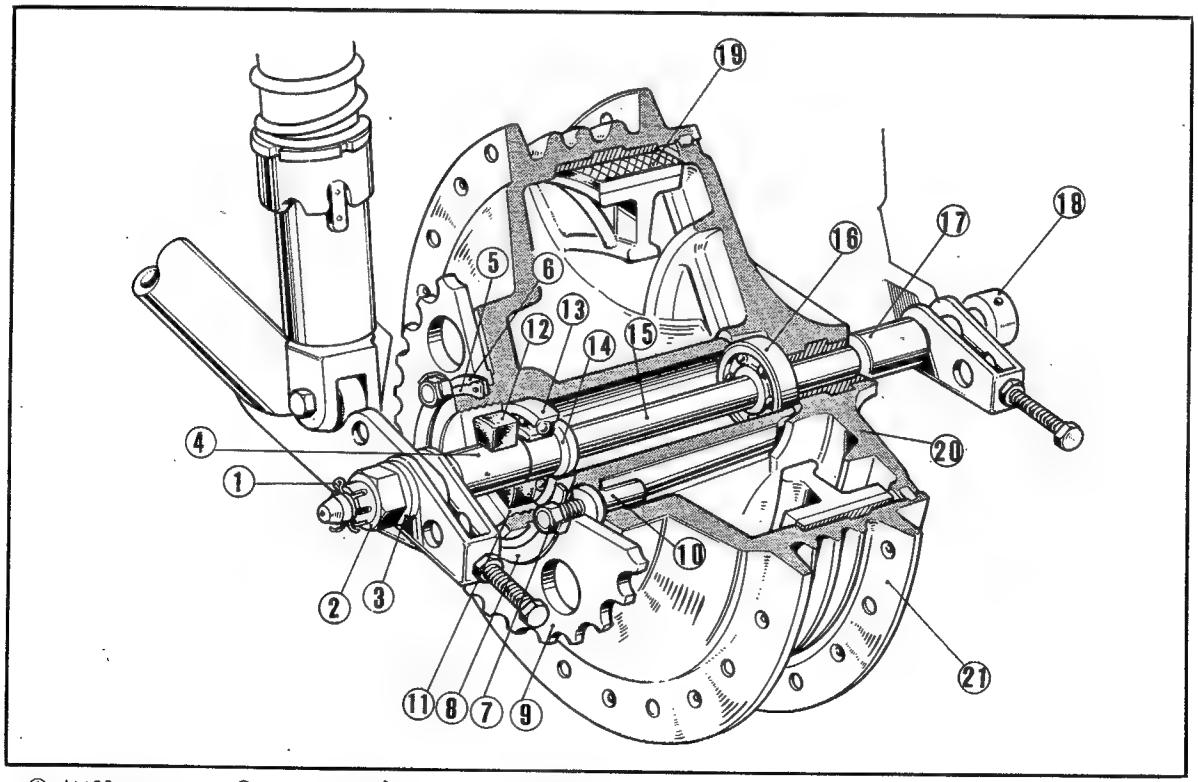
Ⓐ Decrease Ⓑ Increase
Fig. 4–82. Front brake cable adjustment

4. Assemble the panel together with the distance collar to the front wheel.
5. After tightening the front axle, mount the front wheel on the fork, connect the front brake stopper arm and assemble the front axle holder with 8mm nut.
6. Connect the speedometer cable to the speedometer gear.
7. Connect the front brake cable to the brake stopper arm and adjust the free travel. The specified free travel is 15～30mm (0.6～1.2in). Make the adjustment with nuts "a" and "b". (Fig. 4–82)

4.14 REAR WHEEL

A. Construction

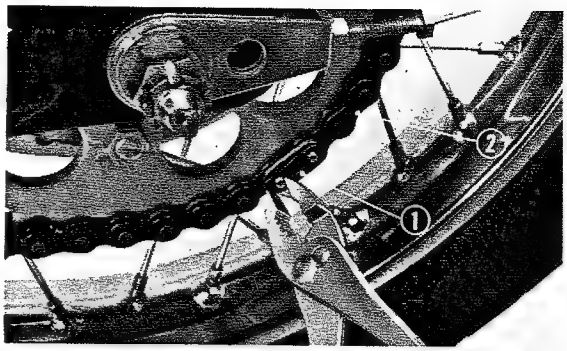
The rear wheel consists of an aluminum casting rear wheel hub which contains 6303Z and 6304Z ball bearings, brake drum, and the brake panel. A single cam rear brake panel is installed on the right side through the panel side collar. The hub and final driven sprocket are mounted on the left side of the wheel hub by the driven sprocket fixing bolts. (Fig. 4–83)



① 4×30 cotter pin ② 16 mm castle nut ③ 16.5×30 washer ④ Rear wheel side collar ⑤ 69 mm external circlip ⑥ 70 mm washer ⑦ 10 mm thin nut ⑧ 10 mm tongued washer ⑨ Final driven sprocket ⑩ Driven sprocket fixing bolt ⑪ Rear wheel bearing retainer ⑫ Dust-seal ⑬ 6304Z ball bearing ⑭ Rear axle distance collar B ⑮ Rear axle distance collar A ⑯ 6303Z ball bearing ⑰ Rear wheel collar ⑱ Rear wheel axle ⑲ Rear brake shoe ⑳ Rear brake panel ㉑ Rear wheel hub
Fig. 4–83. Cross-section of rear wheel

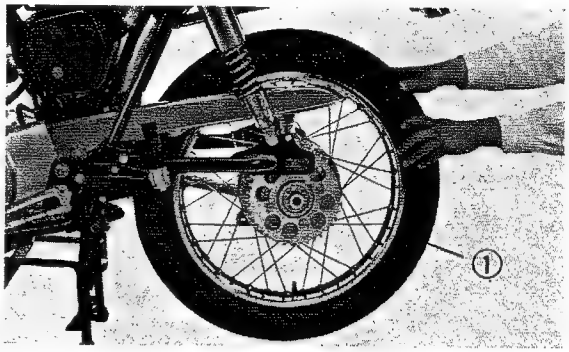
B. Disassembly

1. Remove the drive chain joint, and disconnect the chain. (Fig. 4–84)
2. Remove the rear brake adjusting nut ; separate the brake rod from the brake arm ; remove the rear brake stop per bolt and separate the stop per arm from the panel.
3. Extract the cotter pin from the axle.



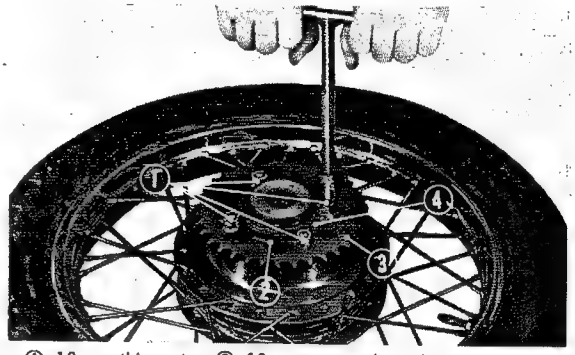
① Drive chain joint ② Drive chain
Fig. 4–84. Removing the drive chain joint

4. Remove the rear axle nut and extract the rear wheel axle. Tilt the motorcycle and remove the rear wheel. (Fig. 4–85)



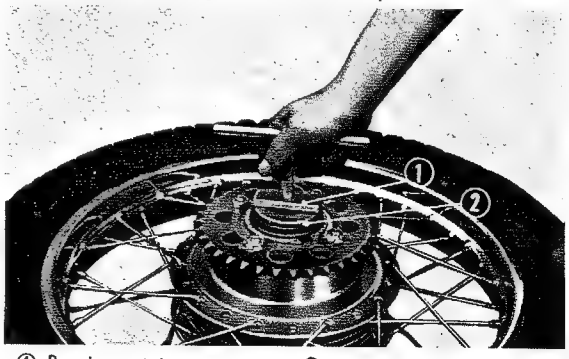
① Rear wheel
Fig. 4–85. Removing the rear wheel from the frame

5. Remove 69 mm external circlip, and 70 mm washer straighten the 10 mm tongued washer, and remove the 10 mm thin nuts. The final driven sprocket can then be separated from the rear wheel hub. (Fig. 4–86)

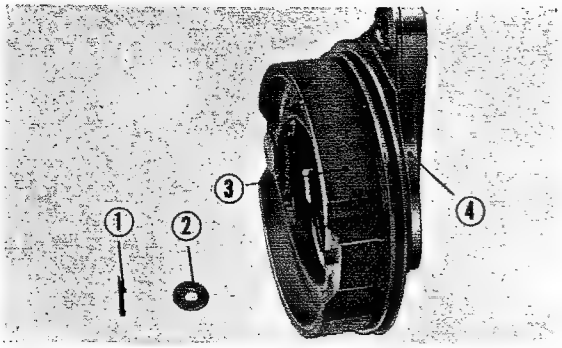


① 10 mm thin nuts ② 10 mm tongued washer
③ Final driven sprocket ④ 69 mm external circlip
Fig. 4–86. Removing the final driven sprocket

6. Remove the rear wheel bearing retainer. Pull out the 6303Z and 6304Z ball bearings, and rear axle distance collar. (Fig. 4–87)



① Bearing retainer extractor ② Bearing retainer
Fig. 4–87. Removing the bearing retainer



① 2×15 cotter pin ② Brake shoe setting washer
③ Rear brake shoe ④ Rear brake panel
Fig. 4-88. Removing the rear brake shoe

7. Remove 2×15 mm cotter pin and anchor pin washer. Separate the brake arm from the panel in order to extract the rear brake shoe. (Fig. 4-88)

① Tire lever ② Rear wheel rim ③ Rear wheel tire
Fig. 4-89. Removing the rear wheel tire

8. Using tire irons, remove tire as illustrated in Fig 4-89 and remove tube. (Fig. 4-89)

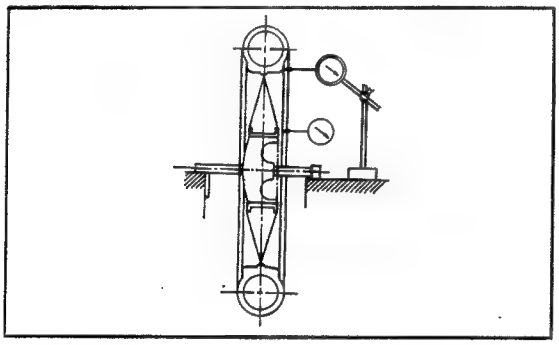
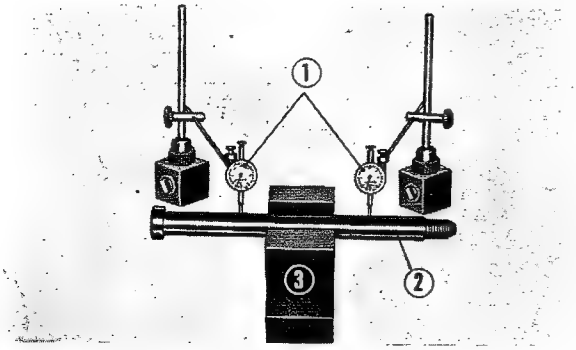


Fig. 4-90. Checking the front wheel rim for runout

C. Inspection

1. Rim runout. (Fig. 4-90)

Item	Standard Value	Serviceable Limit
Side runout	Dial runout with in 0.5 mm (0.020 in)	Replace or repair when more than 2.0 mm (0.079 in)
Vertical runout	Dial runout with in 0.5 mm (0.020 in)	Replace or repair when more tnan 2.0 mm (0.079 in)



① Dial gauge ② Rear wheel axle ③ V-block
Fig. 4-91. Checking the rear axle for bend

2. Axle bend and wear. (Fig. 4-91)

Item	Standard Value	Serviceable Limit
Out side dia.	16.957～16.984 mm (0.668～0.669 in)	Replace when less than 16.95 mm (0.667 in)
Bend	Within 0.05 mm (0.002 in)	

3. Final driven sprocket root diameter.

Item	Standard Value	Serviceable Limit
Root dia.	188.54～188.66 mm (7.423～7.428 in)	Replace when less than 188.34 mm (7.415 in)

4. 6303Z and 6304Z ball bearing axial and radial clearance.

6303Z ball bearing

Item	Standard Value	Serviceable Limit
Axial clearance	Not more than 0.07 mm (0.003 in)	Replace when more than 0.1 mm (0.004 in)
Radial clearance	0.003～0.018 mm (0.0001～0.0007 in)	Replace when more than 0.05 mm (0.002 in)

6304Z ball bearing

Item	Standard Value	Serviceable Limit
Axial clearance	Not more than 0.08 mm (0.0032 in)	Replace when more than 0.11 mm (0.0043 in)
Radial clearance	0.0005～0.0020 mm (0.0002～0.0008 in)	Replace when more than 0.06 mm (0.0023 in)

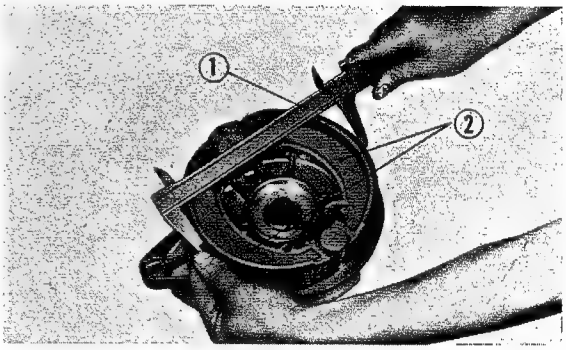
5. Rear brake shoe diameter and lining thickness.

Item	Standard Value	Serviceable Limit
Out side dia.	161.0～161.4 mm (6.339～6.354 in)	
Thickness	5.5～5.7 mm (0.217～0.224 in)	Replace when less than 3.0 mm (0.118 in)

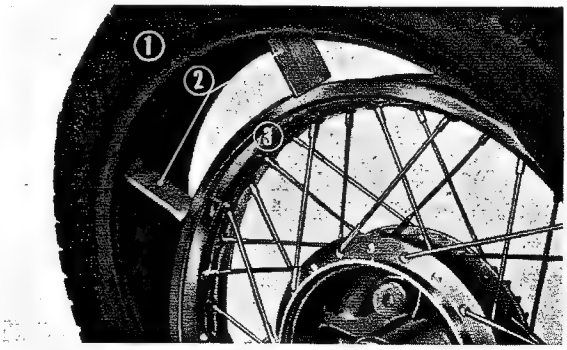
6. Rear brake cam thickness. (Fig. 4-92)

Item	Standard Value	Serviceable Limit
Thickness	8 mm (0.315 in)	Replace if worn, deformed or unusual

7. Check the anchor pin for bend.
8. Inspect and tighten all loose spokes.
   Tightening torque : 20～25 kg-cm (1.4～1.8 ft-lb.)
9. Inspect tube for air leak by inflating and immersing it in water.
10. Inspect the casing for any damage on the inside and outside. (Fig. 4-93)



① Vernier calipers ② Rear brake shoe
Fig. 4-92. Measuring the outside of the rear brake shoe



① Rear wheel tire ② Wood spacer piece
③ Rear wheel rim
Fig. 4-93. Inspection the inside of tire

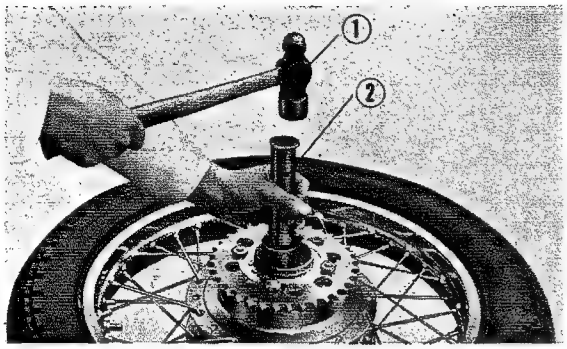
D. Reassembly

1. The tube can be easily mounted by inflating with small amount of air to make the tube firm.

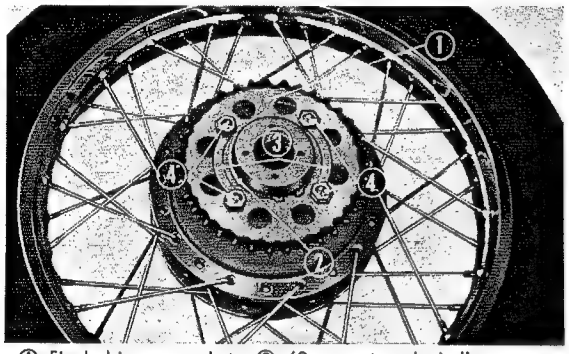
NOTE :

- After the tire is mounted, inflate with approximately 1/3 the designated pressure ; lightly tap around the tire with a wooden hammer to eliminate any pinching of the tube.
- The valve stem should be pointed toward the axle.
- Inflate the tire to the specified pressure.
  For normal riding : 2.0kg/cm^2 (28.4 lbs/in^2)
  For high speed riding : 2.2kg/cm^2 (31.3 lbs/in^2)

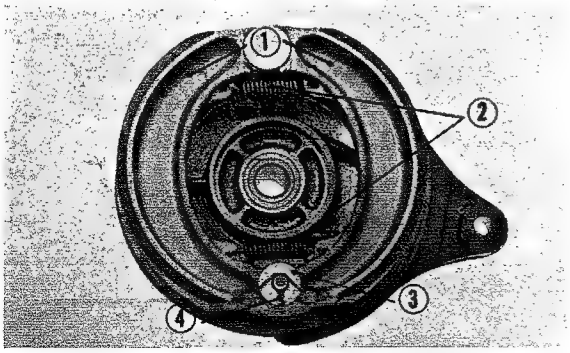
2. Grease the 6304Z ball bearing and pack the rear wheel hub with grease. Insert the spacer and drive the bearing into place using a bearing driver. (Fig. 4-94)



① Hammer ② Bearing driver
Fig. 4-94. Installing the bearing



① Final driven sprocket ② 69 mm external circlip
③ 10 mm tongued washer ④ 10 mm thin nut
Fig. 4-95. Assembling the final driven sprocket



① Rear brake shoe ② Rear brake shoe spring
③ Brake shoe setting washer ④ 2×15 cotter pin
Fig. 4-96. Installing the brake shoe

NOTE :

The 6303Z and 6304Z ball bearing incorporate a seal on the outside, therefore, make sure that the bearing is not inverted.

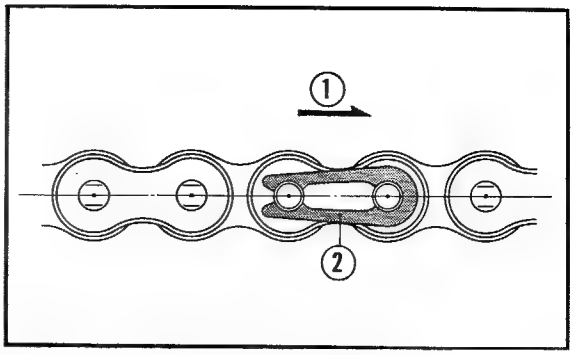
3. Mount the final driven sprocket on the drive flange with the sprocket retaining bolts, nut and tongued washer. (Fig. 4-95)
4. Assemble the rear brake shoe to the brake panel and install the spring to hold the shoe in place.

   Install the rear brake cam and brake arm on the panel. Assemble the brake shoe setting washer and lock with the cotter pin. (Fig. 4-96)

NOTE :

When installing the brake arm on the panel, align the punch marks on the brake arm and brake cam.

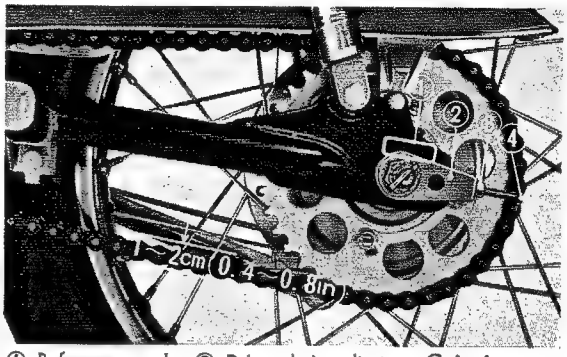
5. The chain clip setting should be carefully made by paying attention to the chain driving direction. (Fig. 4-97)
6. Assemble the panel on the rear wheel and mount the wheel assembly on the frame. Install the drive chain and make the proper adjustment before final torquing of the rear wheel axle.



① Chain driving direction ② Chain clip
Fig. 4-97. Setting the chain clip

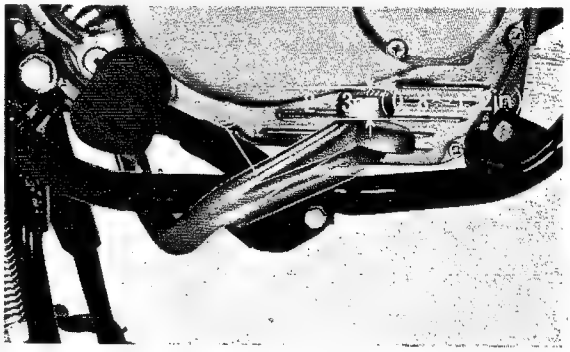
NOTE :

Adjust the chain so that there is 1 to 2 cm (0.4 to 0.8 in) of slack and make sure that the chain adjusters on both sides are in the same relative position. (Fig. 4-98)



① Reference mark ② Drive chain adjuster ③ Lock nut
④ Drive chain adjusting bolt
Fig. 4-98 Adjusting slack of drive chain

7. Install the rear brake stopper arm to the rear brake panel.
8. Install the rear brake rod to the brake arm. Set the rear brake pedal on its side and adjust rear brake play.

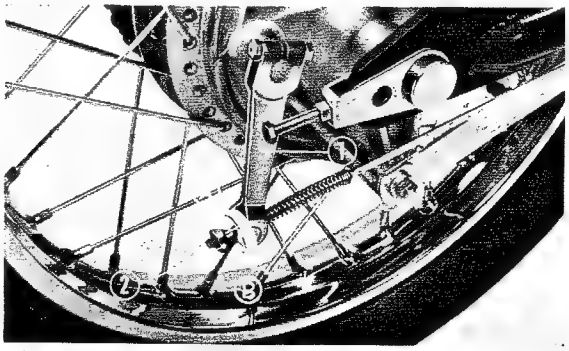


① Rear brake pedal
Fig. 4-99. Rear brake pedal play

NOTE :

The free travel of the rear brake pedal should be from 2 to 3 cm (0.8 to 1.2 in). (Fig. 4-99, 100)

9. Install the chain case.



① Rear brake arm ② Rear brake adjusting nut
Ⓐ Increase Ⓑ Decrease
Fig. 4-100. Adjusting the rear brake

MEMO

5. ELECTRICAL PARTS

5.1 ELECTRICAL EQUIPMENT

1. Ignition system (ignition coil, condenser, contact breaker, spark plug)
2. Generating system (A.C. dynamo)
3. Rectifying system (selenium rectifier)
4. Battery
5. Connected load (lights, horn, starter)

The electrical equipment are the nerve system of the motorcycle and perform the vital functions of providing engine ignition, lighting for night riding and horn; the malfuction of any one of these will adversely effect the motorcycle operation. Therefore, careful attention must be given to their maintenance.

NOTE:

All the following description are applicable to the Honda 250/350; CB250, CL250, CB350, and CL350, unless otherwise noted.

5.2 POWER SUPPLY SYSTEM

The Honda 250/350 employs the battery ignition system, utilizing the ignition coil and contact breaker. The generating system is a special A.C. dynamo for greater output. A selenium rectifier is incorporated for battery charging and supplying power to the connected loads.

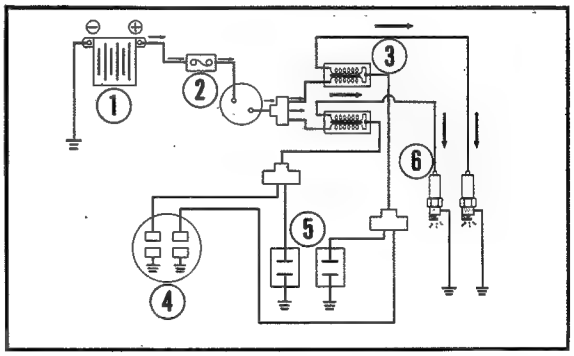
5.3 IGNITION CIRCUIT

A. Ignition System

In a gasoline engine, the air-fuel mixture is ignited by some means at a precise time during the end of the compression cycle of the piston to produce combustion to operate the engine. This motorcycle utilizes a high voltage battery ignition system. (Fig. 5-1)

B. Ignition Coil

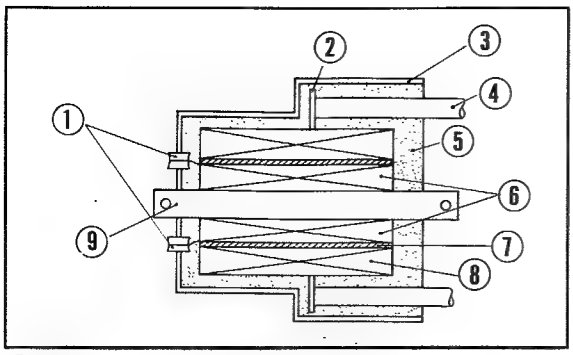
This motorcycle incorporates a 180° type crankshaft. The left and right cylinders are equipped with an independent ignition coil. (Fig 5-2)



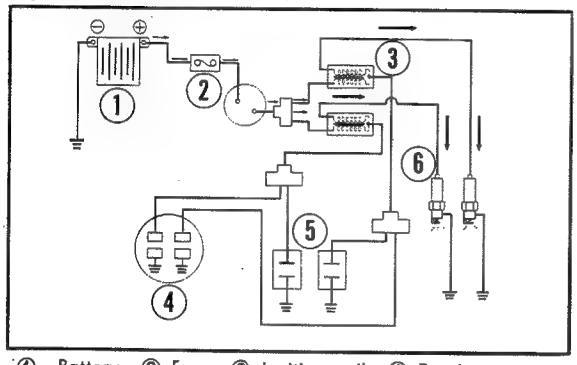
① Battery ② Fuse ③ Ignition coil ④ Breaker point
⑤ Condenser ⑥ Spark plug

Fig. 5-1. Ignition system

Fig. 5-2. Ignition coil



① Primary terminal ② High tension terminal ③ Case
④ High tension cord ⑤ Synthetic resin ⑥ Primary coil
⑦ Bobbin ⑧ Secondary coil ⑨ Iron core
Fig. 5–3. Sectional view of ignition coil



① Battery ② Fuse ③ Ignition coil ④ Breaker point
⑤ Condenser ⑥ Spark plug
Fig. 5–4. Ignition system

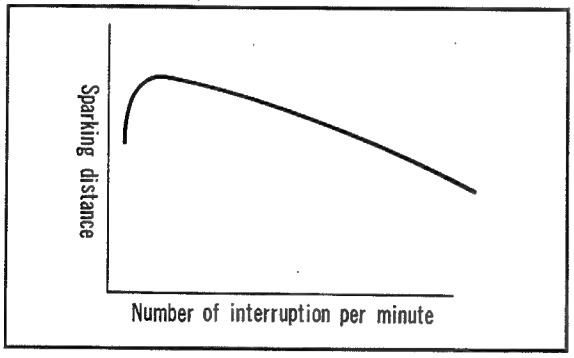
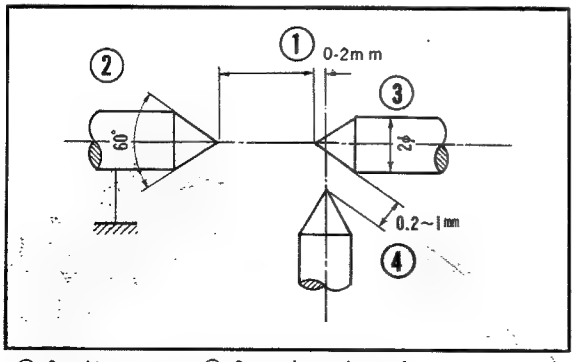


Fig. 5–5. Spark characteristics



① Sparking space ② Secondary electrode
③ Primary electrode ④ Tertiary electrode
Fig. 5–6. Vertical type electrode space

1. Construction

The primary coil has 200 to 300 turns of 0.6 mm (0.024 in) enamelled copper wire wound on an iron core. The secondary coil has 10,000 to 20,000 turns of fine enameled copper wire of 0.08 mm (0.003 in) diameter wire wound on top of the primary coil and covered with dielectric material; and the complete unit is then molded in synthetic resin with two exposed output terminals. (Fig. 5–3)

2. Principle of operation

When the camshaft is rotated in a direct cyclic relation to the crankshaft, a high voltage is induced in the secondary coil by the following sequence of events. (Fig. 5–4)

a. With the contact breaker points closed, current which flows through the primary coil in the direction shown by the arrow induces a magnetic field and energizes the iron core.

b. Next, when the breaker points are opened by the cam, the magnetic field induced by the primary coil suddenly starts to collapse.

c. Due to the sudden change in the magnetic field and the large number of windings in the secondary coil, a high voltage is induced in the secondary coil.

d. The induced high voltage initially energizes the secondary coil and as the voltage rises, it flows through the high tension cord to the spark plug.

e. When the voltage rises to a certain level, the current jumps across the spark plug electrode gap and ignites the fuel mixture in the combustion chamber. After the voltage build-up has been discharged, the voltage drops suddenly and discharges the entire voltage build-up which was charged in paragraph d above. This is followed by the discharge of the energy stored in the coil.

f. The magnetic field rapidly falls to the point that the arcing across the spark plug gap can no longer be sustained and consequently ceases.

g. The residual energy in the coil due to the weakened magnetic field produces a damped oscillation in the secondary and the primary coils and is dissipated in the circuit as resistance.

h. This operation is repeated by the preset angle of the cam and the sequence of events is recycled back to paragraph a.

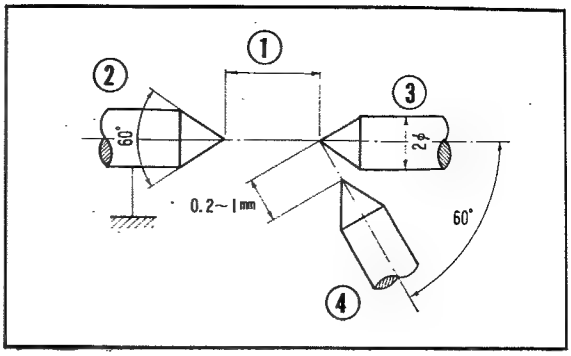
3. Testing

The performance of the ignition coil does not normally deteriorates provided that the coil is not damaged by a hard blow or the terminal areas kept free of dirt, oil and other foreign matters. Refer to Section 5.9 Service Tester, C9, 10 for testing of the coil. (Fig. 5-4, 5, 6, 7)

4. Coil spark characteristics

Engine rpm	Spark	Battery voltage
300	7 mm (0.276 in) Min	8 Volts
10,000	7 mm (0.276 in) Min	14 Volts

For right and left ignition coil for engine with 180° type crankshaft.

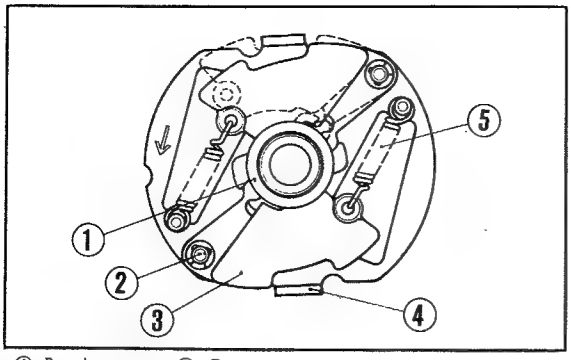


① Sparking distance ② Secondary electrode
③ Primary electrode ④ Tertiary electrode
Fig. 5-7. 60 degree type electrode space

C. Spark Advancer

The spark advancer is a device which automatically advances the ignition timing with the increase in engine speed. To do this, the breaker arm is held stationary and the position of the cam is changed corresponding to the engine speed. The spark advancer utilizes the centrifugal force to move the cam. The spark advancer when static, is held in the zero advance position (5° BTDC) by the force of the spring as shown in Fig. 5-8. As the speed of the engine increases, the centrifugal force of the advancer weight overrides the force of the spring and starts to move outward, moving the cam in the direction of rotation, in other words, advances the cam to produce an early ignition.

Fig. 5-8. Spark advancer



① Breaker cam ② Governor weight support
③ Governor weight ④ Governor weight stopper
⑤ Governor weight spring
Fig. 5–9. Spark advancer mechanism

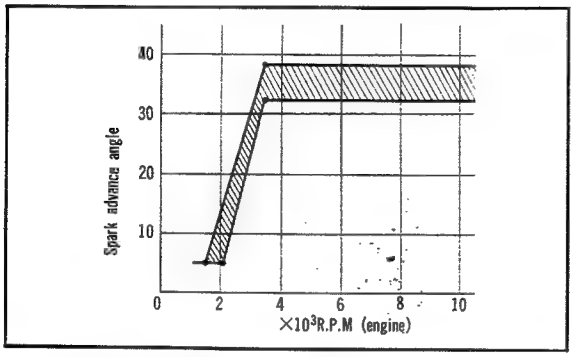


Fig. 5–10. Spark advancer characteristic

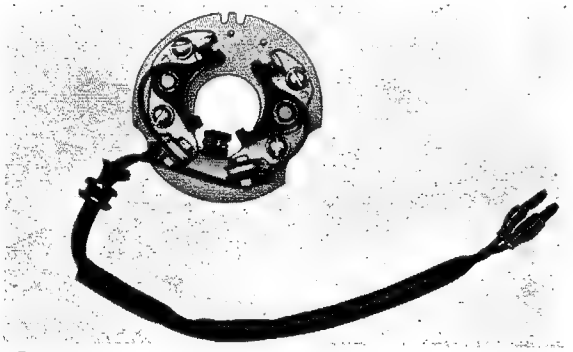


Fig. 5–11. Contact breaker

The dotted lines in Fig. 5–9 show the cam in full advanced position. Spark advancer starts functioning at an engine speed of approximately 1800 rpm and becomes fully advanced at 3500 rpm, advancing the spark 35°. The spark advancer is assembled on the camshaft and at the exposed breaker point area, only the breaker point cam is visible. The major portion of the spark advancer mechanism is located behind the breaker point assembly plate and is not easily accessible. The entire assembly is mounted on the left front side of the cam case providing good stability. The spark advance characteristics are shown in Fig. 5–10.

Start of spark advance :	1500–2100 rpm engine speed
Spark fully advanced :	3500–3900 rpm engine speed
Total spark advance angle :	32°–38°

D. Contact Breaker

The contact breaker is mounted on the camshaft together with the spark advancer and performs an important function of positively disrupting the primary ignition circuit.

The contact breaker is mounted on a base plate and is composed of a breaker arm, points (fixed and movable), primary terminal, spring and lubricating felt. A movable contact point is mounted on one side of the breaker and is electrically insulated from the base. (Fig. 5–11)

It is essential that the action of the breaker arm always be smooth and in order to minimize the inertia, it must also be light and compact in addition to being strong. A strong spring tension is required on the breaker arm to prevent chattering during the collapse of the primary circuit, while the tension must not be excessive to eliminate wear of the friction parts. The wear would then result in change to the igniton timing. It should normally be between 700–900 gr (1.54～1.98 lb).

To prevent wear to the friction parts, apply a small amount of grease to the felt lubricating wick and also remove the breaker arm and apply grease to the groove in the shaft or to the lubrication hole.

On this model, a camshaft with a single profiled cam lobe incorporating a spark advancer is installed in the came case Two contact breakers are mounted on the base plate directly opposite and forming an angle of 90°. It is designed to operate with their respective rigt and left cylinder to provide the proper ignition timing.

NOTE :

- Oil on the point surface will cause :
  a. Darkened points, resulting in excessive wear.
  b. If oil is left for a long time without removal, a hard film will be formed and eventually result in misfiring.
- Dress the pitted or dirty point with either a point file or emery paper, however, if the condition is relatively severe, remove the breaker arm and dress the points on both the arm and the stationary point with an oil stone, making sure that the points will have parallel contact when assembled. The point gap should be adjusted to 0.3–0.4 mm (0.012 –0.016 in.)
- Replace the breaker arm if the pivot hole is worn excessively.
- Always maintain the contact breaker terminal and insulators as well as the wiring free from water, oil, and foreign matters.
- After the points have been dressed, clean the surfaces with a clean rag soaked in small amount of trichloroethylene, further, oil or other foreign matters should not be permitted on the breaker assembly.

E. Condenser

The purpose of the condenser is to prevent unwanted sparking across the points, however, if the condenser capacity is too large, ignition spark will deteriorate. The condenser should normally have a capacity of 0.24±10% μF. Further, a high voltage of several hundred volts will be applied to the condenser at the moment that the points open and therefore, it must be able to withstand a high surge voltage. (Fig. 5–12)

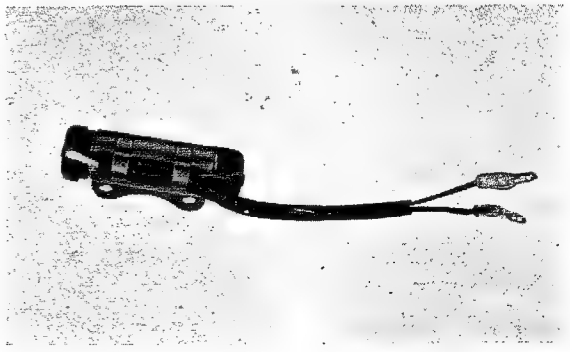


Fig. 5–12. Condenser

A simple condenser test can be performed during the insulation resistance test with the megger. Remove the condenser from the megger and contact the lead terminal with the condenser metal case. If a good strong spark is produced, the condenser can be considered in satisfactory condition. It is unlikely that the capacitance value of the condenser will change. With the use of the service tester, an accurate measurement can be made of the capacity and resistance value. (Refer to the section 5.9 Service Tester C4)

F. Spark Plug

Spark plug performs one of the most important functions of the engine ignition system. The high voltage produced by the ignition coil is routed through the high tension lead to the spark plug and causes the current to discharge across the center electrode to the side electrodes in a form of a spark within the combustion chamber of the engine. This spark ignites the compressed fuel mixture which produces the energy to operate the engine. Since it must perform under different adverse conditions, durability and reliability are primary requirements. The Honda 250/350 uses the spark plug type NGK B-8ES.

1. Spark plug requirements

   In order for the spark plug to perform satisfactorily, it must fulfill the following conditions.

   a. Electrical insulation :

      Electrical current follows the path of least resistance and, therefore, it is constantly seeking a path having less than that of having to jump across the spark plug gap. The resistance of the insulator under normal temperature is high but it deteriorates with increases in temperature, therefore, the insulator must be made of material that does not change with the temperature.

   b. Mechanical property :

      The pressure within the cylinder during combustion is from 35 to 45 kg/cm^2. If the spark plug is inadequately sealed, the pressure will leak through the spark plug and also causing the plug to heat up, resulting in loss in efficiency. The spark plug must possess superior mechanical properties so that it is able to withstand high temperature and pressure as well as vibration and shock.

c. Heat conduction :

The combustion temperature of the fuel mixture exceeds 2,000°C (3,632°F) within the cylinder and this heat must be dissipated as rapidly as possible or the plug will overheat, causing preignition as well as damaging the electrodes. This will prevent effecient performance of the engine. Spark plug must, therefore, be able to withstand rapid temperature changes and further must also be able to dissipate the heat produced by the combustion gas.

d. Carbon deposit :

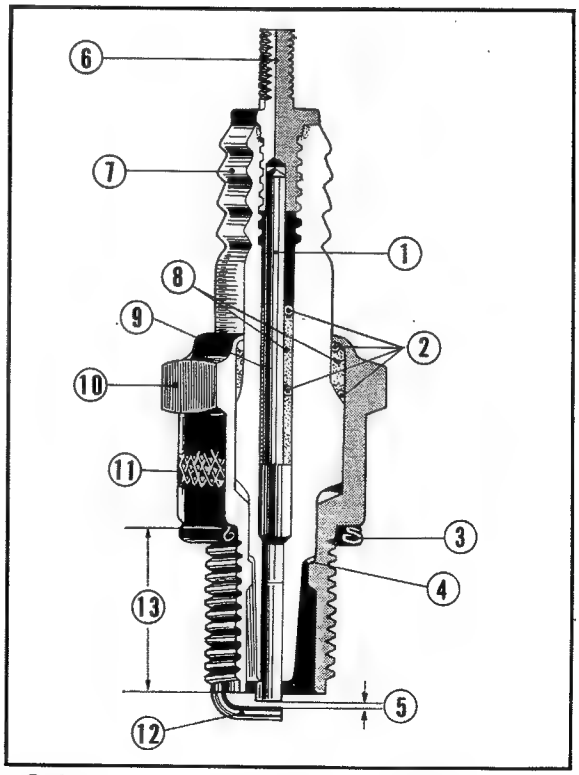
When carbon deposits build up around the insulator due to improper combustion, part of the high voltage is lost and a poor spark is produced at the spark plug electrodes, causing engine malfunction.

e. Lead compound :

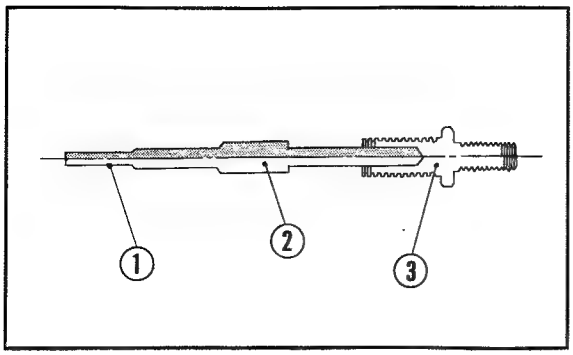
Tetraethyl lead is added to the gasoline as an antiknock additive. Lead oxide is formed during combustion and adheres to the insulator of the spark plug. This becomes an electrical conductor at high temperature and causes the partial loss of the high voltage current; resulting in engine malfunction. It is required that the insulator and the electrodes be free from being chemically affected under high temperature condition.

2. Spark Plug

The constructibn of the spark plug most commonly used today is shown in cross section by Fig. 5-13.



① Center electrode ② Wire packing ③ Gasket
④ Plate packing ⑤ Spark gaps ⑥ Terminal
⑦ Insulation (with corrugation) ⑧ Filled powder
⑨ Bonding ⑩ Hex. nut ⑪ Metallic main body
⑫ Side electrode ⑬ Length of thread (reach)
Fig. 5-13. Cross-section of spark plug



① Special nickel alloy material ② Copper wire material
③ Iron wire material
Fig. 5-14. Electrode construction

a. Electrode

The material of which the electrode is made should be one that is highly resistant to wear, possess low discharge voltage, high heat conductivity, acid resistance and must be a good electrical conductor; further, it must be readily workable. Nickle alloy and metal having high heat and corrosion resistance is used. (Fig. 5-14)

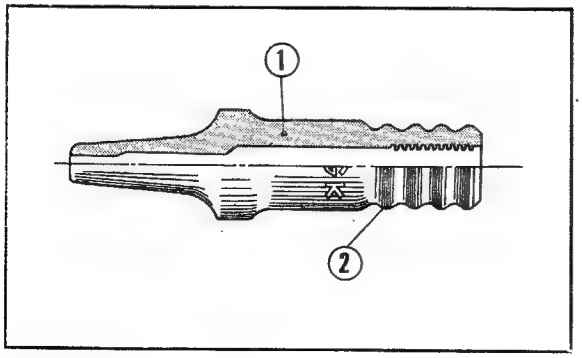
b. Insulator

The insulation is usually made of high quality alumina. Since voltage of 6 to 15 KV is applied to the electrode and exposed to temperature exceeding 2000°C, the insulator must be able to withstand these conditions. The chief benefits derived from using this type insulator are:

(1) The insulating property under high temperature condition is superior and the possibility of flashover is reduced due to the ribs formed on the head of the insulator body. Misfire of the ignition under high speed and loaded condition is eliminated.

(2) Due to its good heat conducting property, the heat of the plug is rapidly dissipated, preventing any overheated condition.

(3) Its high resistance to thermal shock prevents damages to it from sudden heating and cooling.



① High quality alumina
② Corrugation (flashover prevention)
Fig. 5-15. Insulator construction

c. Powder Filter

Different types of powder filler are used to form a seal between the insulator and the center electrode as well as between the insulator and the metal shell. The heat of the center electrode is uniformly dissipated to provide a product having a uniform quality heat range. A special alloy having a high heat resistant value is used for the center electrode to minimize the wear and meet the high compression pressure of the engine. Further, a large center electrode is used for rapid heat dissipation and also to reduce wear.

3. Spark plug thermal characteristics

The thermal characteristics of the plug are the most important factor of the spark plug operating efficiency. Suitability of the spark plug for an engine is based on its thermal characteristics.

a. Ideal condition for plug performance

The tip of the spark plug extended into the cylinder head is constantly exposed to contamination by the carbon produced as a product of fuel combustion and also to the oil entering the combustion chamber. These foreign matters are electrical conductor and when it forms on the electrodes, a short circuit path for the high voltage is produced. As a result, the ignition spark becomes deteriorated causing engine to misfire, resulting in loss of power and in extreme case, the engine becomes inoperative. In order to prevent this condition, the insulator firing area must be maintained at a temperature which will burn off the carbon. This temperature will vary with different type engine, riding condition and type fuel used, but it is generally between 450°C and 600°C (842°F and 1,112°F). This temperature is referred to as the self-cleaning temperature. If this temperature is too high, the insulator firing area will become overheated, igniting the fuel mixture and causing a phenomena called pre-ignition. This will cause loss of power in the engine, therefore, the insulator firing area should be held below 800°C (1,472°F), with some degree of variance for different type engine, to prevent pre-ignition. In other words, the firing area of the insularor should be neither too cold nor too hot.

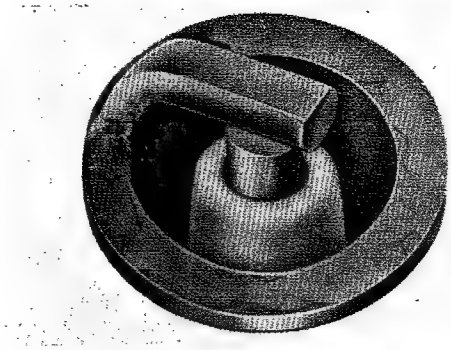


Fig. 5–16. Satisfactory condition

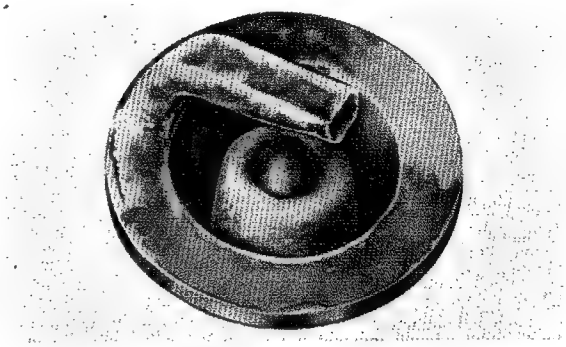


Fig. 5–17. Excessively burnt condition

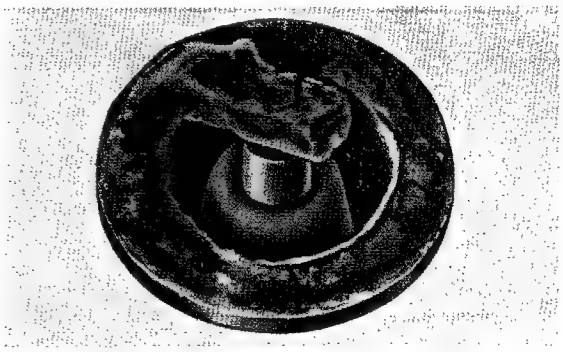


Fig. 5–18. Sooty condition (dry)

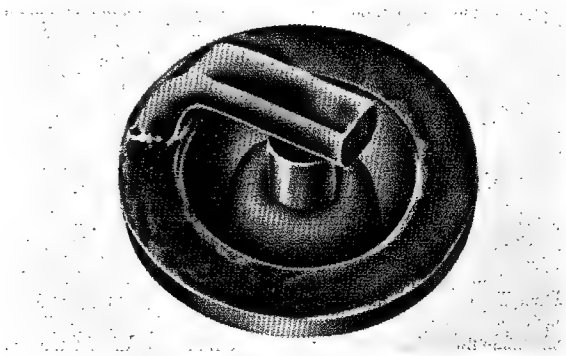


Fig. 5–19. Sooty condition (wet)

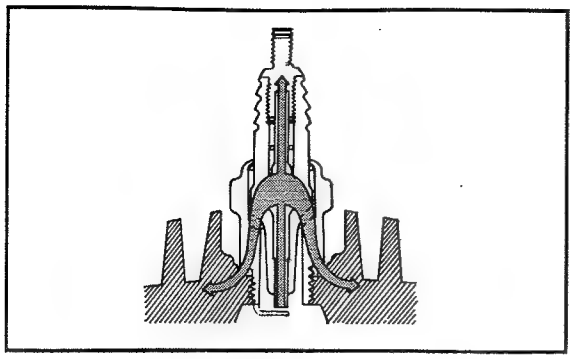


Fig. 5-20. Heat dissipation

b. Heat dissipation

The spark plug heated by the heat of combustion from the engine is dissipated by the path shown in Fig. 5-20. The heat from the combustion must be equal to the heat dissipated ; by so doing, the insulator firing area can be maintained at a constant temperature. (Fig. 5-20)

c. Heat Range

The temperature of the spark plug in the engine will differ largely with the condition such as, the type of engine (whether air or liquid cooled, 2 or 4 cycle), design (compression ratio, shape of the combustion chamber, location of the spark plug etc.), operating condition (speed, load, type fuel).

The spark plug must function satisfactorily under these varying conditions. The rate of heat dissipation of the plug is called the "heat range". The heat range is determined by the shape, construction, dimension, and the characteristics of the spark plug. A plug which readily dissipates the heat and which is difficult to overheat is referred to as the "cold type" (high temperature use) and the plug which retains the heat and burns readily is referred to as the "hot type" (low temperature use). On engine operating with high temperature, a plug which is difficult to overheat, in other words, the cold type is used and for engine operating with low operating temperature, a hot type plug is used (Fig. 5-21). The Honda 250/350 uses NGK B-8 ES type 14 mm spark plugs.

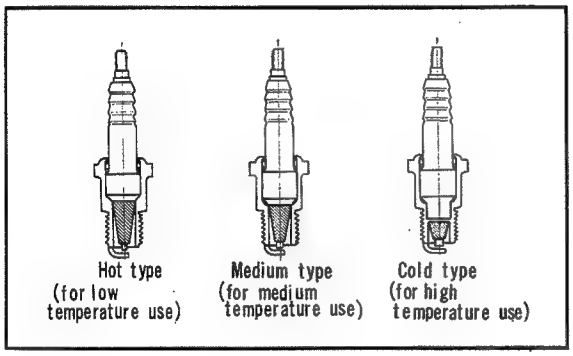


Fig. 5-21. Comparison of heat characteristics

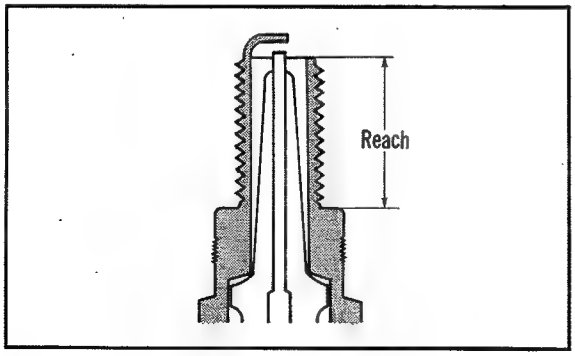


Fig. 5-22. Reach

4. Spark Plug Reach

The reach of the spark plug refers to the length of the threaded section. Plug should be selected which has the proper reach.

The following undesirable condition will develop if plug of improper reach is used.

a. Reach too long

(1) Carbon will be deposited on the exposed thread of the plug and cause damages to the threads in the spark plug hole during plug removal.

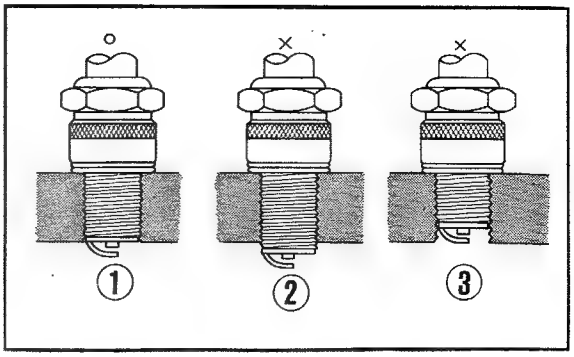
(2) Tip of the spark plug will become overheated and cause pre-ignition.

b. Reach too short

(1) Carbon will be deposited on the threads at the bottom of the plug hole and when the spark plug of the proper reach is installed, the threads in the plug hole will be damaged.

(2) Due to the cavity left by the short reach, exhaust gas will accumulate, causing a decrease in power output, overheating and engine malfunction.

The consequence of using improper reach plug can be detrimental, therefore, make sure that the specified plugs. shall be used. The plug reach of the B-8ES plug is 19 mm (0.748 in.) (Fig. 5-23)



① Reach is correct ② Reach is too long
③ Reach is too short
Fig. 5-23. Spark plug reach

5. Noise Suppressor

The oscillating current which contains the high frequency radio wave produced by the high tension ignition circuit is radiated from the high tension circuit and the vehicle chassis to cause interference to the reception of the radio and television sets. To prevent this undesirable condition, the spark plug is fitted with a suppressor.

The suppressor consists of a resistor incorporated within the plug cap and housed in the shield cover. The resistor functions as a diminishing resistor, the shield cover increases the high frequency suppressing characteristics as a combined part of the suppressor. (Fig. 5-24, 25)

(Caution)

a. The suppressor should be handled in the same manner as the plug cap, however, provide adequate care to the junction of the high tension cord and make sure that the cord is fully screwed in.

b. If the resistance value should accidentally change or if the value should become infinite, it should surely effect the performance ; (discoloration of the outer insulated coating) it is recommended, therefore, that it be changed with a new item.

c. Suppressor with missing waterproof caps should never be used (flashover with consequent malfunction of the ignition system will result)

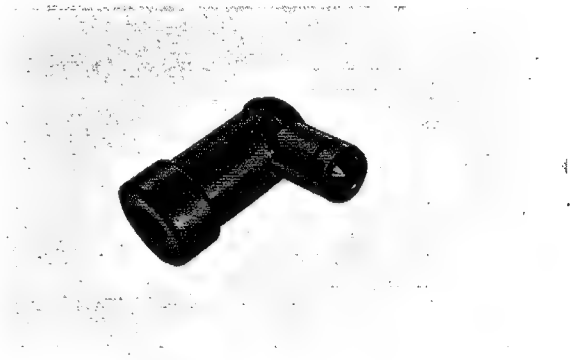
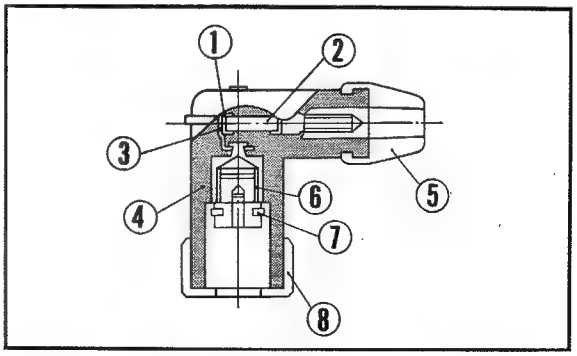


Fig. 5-24. Noise suppressor cap



① Cap ② Resistor ③ Connecting panel ④ Body
⑤ Water proof terminal cap ⑥ Nut ⑦ Terminal spring
⑧ High voltage terminal seal
Fig. 5-25.

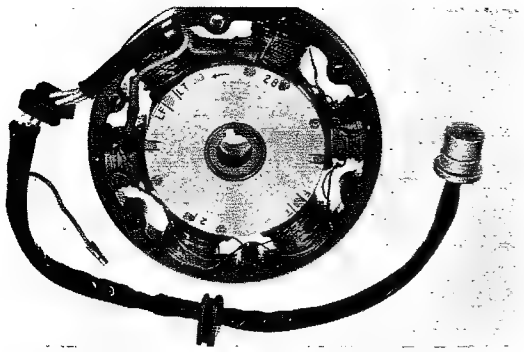
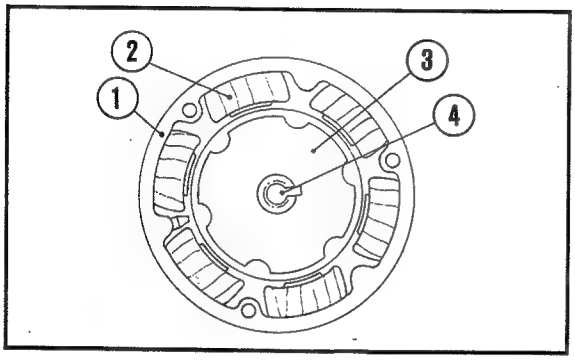


Fig. 5-26. A.C. generator



① Stator ② Coil ③ Rotor ④ Crankshaft
Fig. 5-27. Construction of the A.C. generator

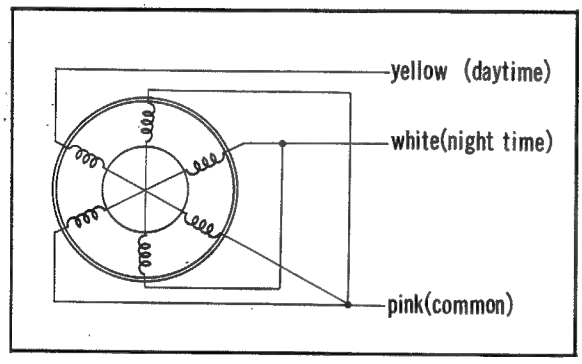


Fig. 5-28. Circuit of A.C. Generator

5.4 POWER CIRCUIT

A. A.C. Generator

The operating principle of the A.C. generator is the same as for the flywheel magneto or the D.C. generator. Electricity is produced by the iron core cutting across the magnetic field.

In an A.C. generator, the voltage produced changes direction alternatively, the frequency per revolution being dependent upon the number of magnetic pole pieces. One frequency change cycle occur each revolution for two pole pieces. As an example, a six pole A.C. generator will have 3 frequency change cycle occuring every revolution.

The change in output voltage is dependent upon the strength of the magnetic field. This change is brought about by the number of poles, magnetic strength of poles, speed of the generator, or by the number of windings in the coil.

The advantage of the A.C. generator is that the malfunction as compared to the other type generator is far less due to its simple construction and fewer moving parts which are subject to wear.

Another major advantage is that the kick starter can be employed as an auxiliary starting method whenever the battery is completely discharged.

This is possible since the A.C. generator induces a large voltage which when fed through the rectifier to the ignition coil or when fed directly to the ignition coil will produce spark sufficiently large to produce an ignition spark.

This feature is a benefit since the battery mounted on motorcycle is a rather low capacity type and the battery often becomes completely discharged due to carelessness. (Fig. 5-26, 27, 28)

B. Current Limiter

The Pointless Regulator is used to prevent the battery from overcharging during long period of driving at high speed. Pointless Regulator used on the Honda 250/350 is a new SCR (Silicon controlled rectifier) type which has no moving parts, an electronic relay utilizing the special features of the semi-conductor. It is compact, light and easy to install. Its biggest advantage is that it provides very stable control of the output voltage and its use is semi-permanent.

1. Installation

This type pointless regulator can be installed on any engine circuit which utilizes A.C. generator for charging the battery, however, make sure that the correct type is used. On the Honda 250/350, a pointless regulator of the type ZR906 (12V) is mounted below the battery box with the two 6 mm hex bolts. (Fig. 5-29)

The construction and the wiring are practically the same with all types; however, since the capacities will differ, one which has the proper capacity must be used or else, it may become damaged.

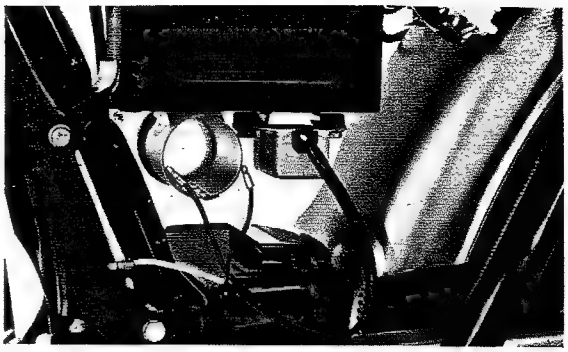


Fig. 5-29. Pointless regulator

2. Operation

As the battery continues to become charged, the resistor within the pointless regulator senses the current flow and as overcharge condition develops, the excess charge current is controlled by grounding.

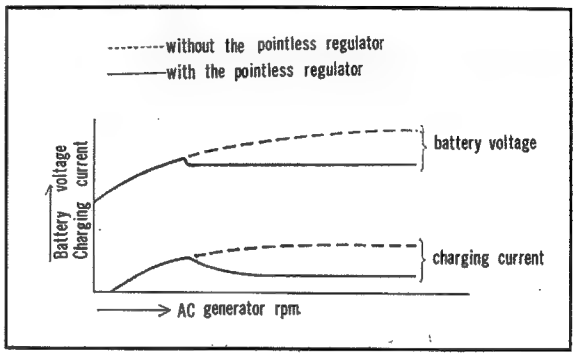


Fig. 5-30. Pointless regulator characteristics

3. Servicing

a. Do not remove the rubber cap installed on the outside of the pointless regulator body. The nut under the rubber cap should not be tampered with. Rubber cap is to prevent grounding and if used without the cap, a possibility of accidental grouding may result.

b. When servicing, make sure that the key switch is in the OFF position.

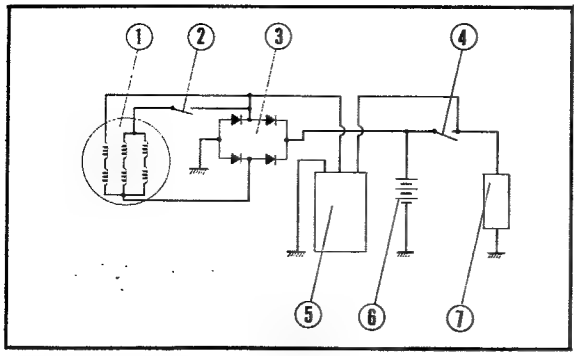
c. During installation, make sure that the unit is properly mounted, and perform the wiring properly.

d. Improperly wired pointless regulator will not only cause damage to the unit, but will also damage the battery.

e. Use only the specified ZR906, 12V type pointless regulator.

4. Characteristic

Fig. 5-30 shows the comparative difference in battery voltage and the battery charging current between the use of the SCR regulator and without its use. (Fig. 5-30)



① A.C. generator ② Headlight switch
③ Selenium rectifier stack ④ Combination switch
⑤ Pointless regulator ⑥ Battery ⑦ Load
Fig. 5-31. Pointless regulator circuit diagram

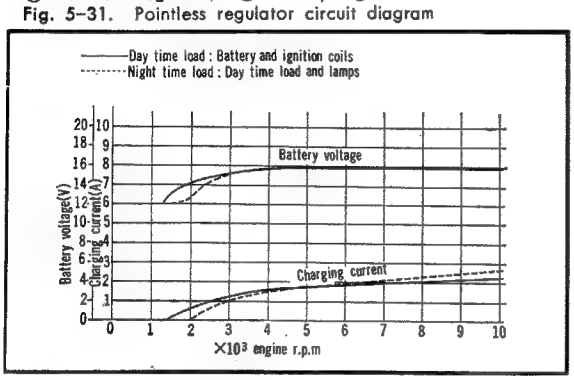


Fig. 5-32. A.C. generator battery charging characteristics (without the pointless regulator)

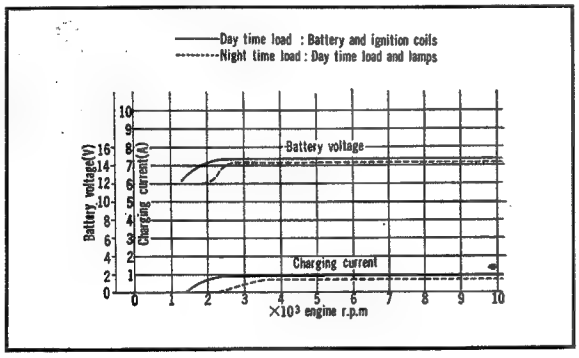


Fig. 5-33. A.C. generator battery charging characteristics. (with the pointless regulator)

This pointless regnlator senses the battery terminal voltage and controls the input from the generator, therefore, the battery terminal voltage is maintained constant without regards to the generator rpm.

When the battery charge is low, the regulator will not function and the battery will be charged with the current as if the regulator had not been connected into the circuit. As the battery becomes charged and approaches and exceeds the value controlled by the regulator the regulator will start functioning, and the excessive current is bypassed to the earth point. (Fig. 5-31)

A.C. generator capacity for the Honda 250/350

The generator charging characteristics under the normal rated electrical load with/without the pointless regulator is shown in Fig. 5-32, 33. Load in addition to the normal accessories may be used, however, due to the increase in the current draw, the beginning of the charging function occurs at a higher generator speed and also, the charging current is decreased.

Specification (without the pointless regulator)

1. Speed and direction of rotation
   Normal : 300 – 11,500 rpm
   Counterclockwise seen from the machine leftside
   Maximum : 15,000 rpm
2. Load
   Day time : 12V, 12AH battery and two ignition coils
   Night time : In addition to the day time load, one 35W, three 3W, one 7W lamps
3. Charging characteristics
   Initial charging speed at the battery voltage 12.6V
   Day time : below 1,400 rpm
   Night time : below 2,000 rpm
   Charging rate at 5,000 rpm (battery voltage 14.8V)
   Day time : 1.5 – 2.5A
   Night time : 1.5 – 2.5A
   Charging rate at 10,000 rpm (battery voltage 15.5V)
   Day time : below 4A
   Night time : below 4A
4. Cable color
   Day time : Yellow
   Night time : White
   Common : Pink

C. Selenium Rectifier

Rectifier is a device which changes the A.C (alternating) current to D.C (direct) current and is used in conjunction with an alternator or A.C generating coil.

The principle of its rectification function is that it permits the current to flow in one direction but allows only a very small amount to flow in the reverse direction. The type rectifier most commonly used are the selenium, silicon and germanium rectifiers.

The rectifying element of the selenium rectifier is an assembly consisting of selenium wafers as terminal plates and spacers in the proper quantity and connected in either parallel or series, depending upon the direction of rectification. (Fig. 5-34)

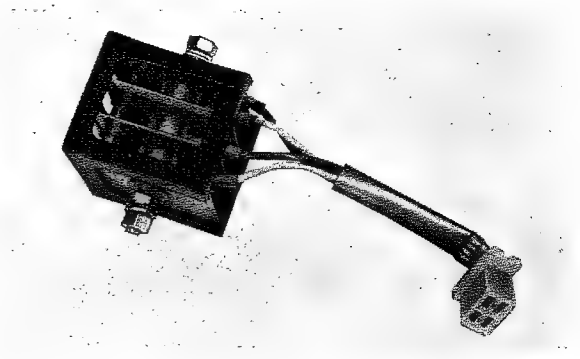
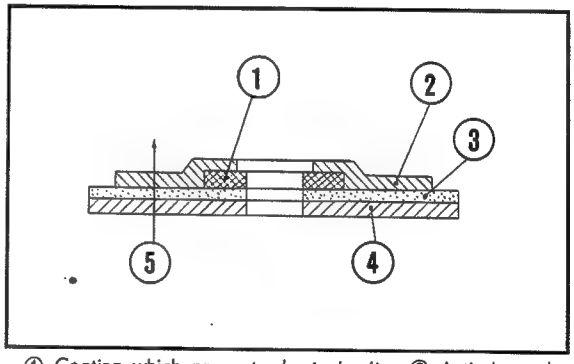


Fig. 5-34. Selenium rectifier stuck

As shown in the figure to the right the rectifier wafers are either circular or square nickel plated steel or aluminum sheet, vacuum coated with highly purified selenium, combined with proper amount of foreign element and heat treated under controlled condition to produce a metallic selenium on which cadmium, bismuth and tin are applied. An electric charge is passed in the opposite direction to the arrow shown in Fig. 5-35 to set up an electrochemical reaction. This will allow the current to readily flow in one direction while creating a large resistance of several thousand times in the opposite direction, permitting only a negligible flow. This is the rectifying function of the selenium wafer. (Fig. 5-35)



① Coating which prevents short circuits ② Anti-electrode ③ Selenium ④ Sheet ⑤ Positive direction

Fig. 5-35. Construction of selenium rectifier

Humidity has a deteriorating effect on the selenum wafer, therefore, waterproof coating is applied to the rectifier, this will also prevent corrosion.

The symbol shown in Fig. 5-36 is used to designate the rectifier. This indicates that the rectifier consists of one or more selenium wafers arranged in either series or parallel, and the direction of the arrow indicates the normal direction of current flow.

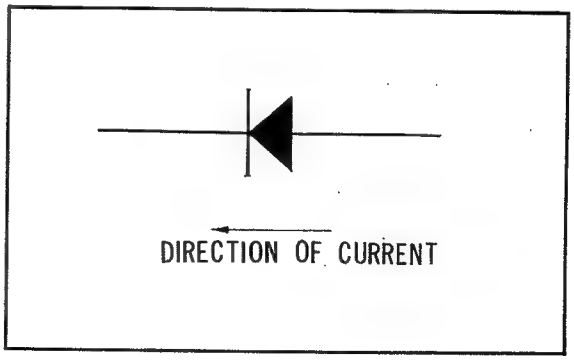
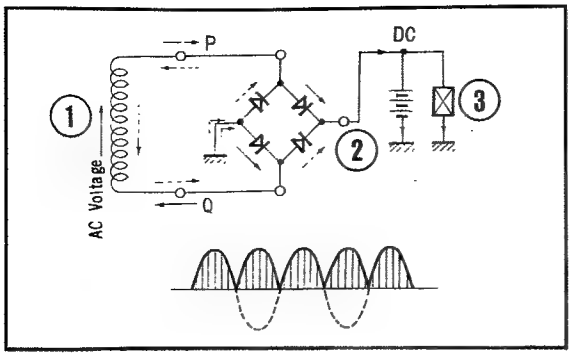


Fig. 5-36. Selenium symbol

Selenium rectifier is durable and since it does not deteriorate with age or usage, its life is practically infinite.

It is relatively efficient for use with low voltage load, therefore, it has found broad usage as a small rectifier.

Further, it has a high overload capacity for a short period of time as compared to the silicon or germanium type rectifiers, and its long service life is another advantage.



① Generating coil ② Battery ③ Load
Fig. 5-37.

On the Honda 250/350, a bridge rectifying circuit is adopted as shown in Fig. 5-37. In this system, a greater number of selenium wafers are used, however, the feature of this type is that a full wave rectification can be achieved rather than a half wave rectification as is the case with other systems. (Fig. 5-37)

Heat will have great effect on the life of the selenium rectifier; it should never be exposed to the ambient temperature over 50°C (122°F). Further, excessive current should not be allowed to flow for any extended period, likewise, voltage exceeding the capacity should not be permitted to flow in the reverse direction as this will puncture the rectifier. However, insulation will quickly form over the punctured area, but with repeated puncturing, the effective rectifying area will be reduced and will evntually result in the overheating of the rectifier. Therefore, in order to handle the voltage generated by the coil, the wafers must be increased to provide for sufficient reverse capacity.

NOTE:

Handling the selenium rectifier

1. Do not allow water to get on the rectifier, make a wrong wiring connection or subject it to abuse. (Selenium rectifier usage is semi-permanent)
2. Using the rectifier without any load connected such as without the battery, will cause a high voltage generated in the coil to flow in the reverse direction and cause puncturing of the rectifier.
3. If this condition is permitted to continued for a long period, the rectifier will be completely destroyed.
4. Selenium rectifier when left unused for a long period of time will have a large reverse current flow. This condition can be corrected by applying about half the normal voltage initially and increasing the voltage to the full rating over a period of one hour, before using the rectifier.

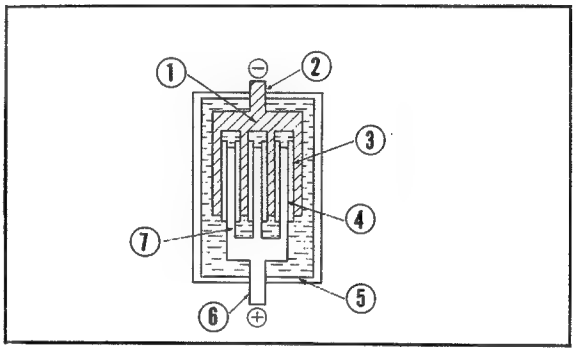
D. Battery

On the Honda 250/350, a vacuum sealed dry charged battery is installed. The servicing and maintenance procedure after its initial electrolyte filling is identical with a conventional battery. The specific servicing information on the vacuum dry charged battery is given in the following section 6. Vacuum Sealed Dry Charged Battery. (Fig. 5–38)

Fig. 5–38. Battery

1. Construction

   Construction of the battery is shown in Fig. 5–39. The positive ⊕ plates are made of lead peroxide, the negative ⊖ plates are made of porous lead sponge. The sulfuric acid is used as the electrolyte. The chemical action caused by two plates being placed in the electrolyte medium generates electrical current. In addition, a separator plate and a sheet of glass fiber mat are placed between the positive and negative plates to prevent their shorting and also to protect the plates from damage due to vibration.



① Pole ② ⊖ terminal ③ Negative plate
④ Separator and glass mat ⑤ Container ⑥ ⊕ terminal
⑦ Positive plate

Fig. 5–39. Battery construction

2. Rating

   Type 12N12A – 4A
   (Vacuum sealed dry charged battery)
   Voltage 12V
   Capacity 12AH
   Specific gravity of electrolyte
   1.260 – 1.280 at 20°C (68°F)
   Electrolyte capacity
   0.72 ℓ (0.190 U.S.gal/0.158 Imp.gal)

3. Battery servicing

   The electrolyte used in the battery must be comprised of pure sulfuric acid diluted to the designated specific gravity. The specific gravity will vary with the temperature, therefore, the specific gravity index is based on the electrolyte temperature of 20°C (68°F). The temperature correction formula should be used to derive at the proper specific gravity for the measured temperature of the electrolyte.

   $S20 = St + 0.0007\ (t - 20)$

   Where: S20 = specific gravity of the electrolyte corrected to 20°C (68°F)
   St = specific gravity of the electrolyte measured temperature, t°C
   t = temperature of the measured electrolyte

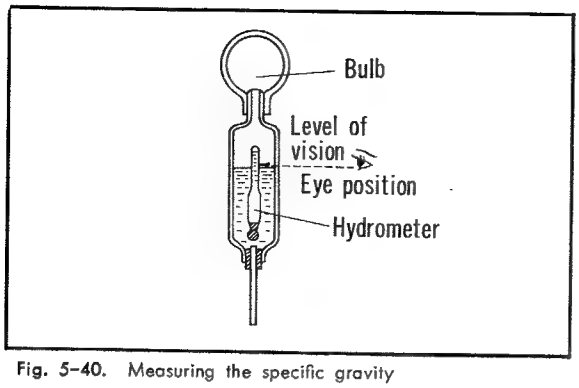
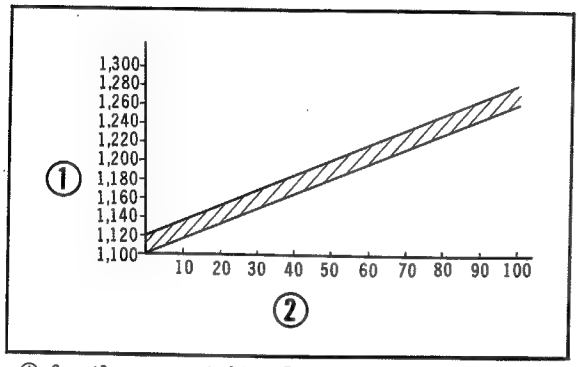


Fig. 5-40. Measuring the specific gravity

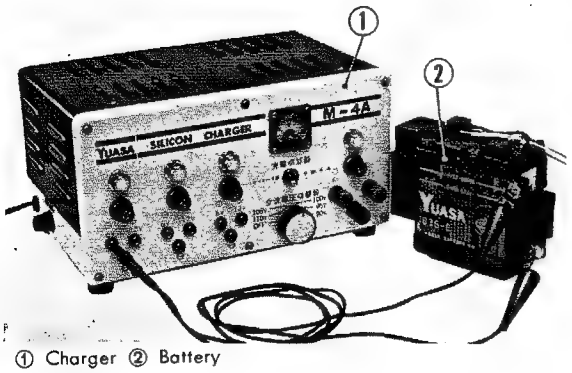
The specific gravity is measured with a hydrometer, the type shown in Fig. 5-40. When making a reading of the measured value, the electrolyte level in the hydrometer should be held at the eye level and the scale read at the fluid level. Temperature of the electrolyte can be measured by a rod thermometer. (Fig. 5-40)



① Specific gravity (20°C) ② Residual capacity (%)
Fig. 5-41. Specific gravity and residual capacity chart

NOTE :

- The relation between the battery capacity and the specific gravity (residual capacity) is shown in Fig. 5-41. When the specific gravity is 1.189 at 20°C (68°F) (less than 50% capacity) the residual capacity is small and if continued to be used in such a condition, it will eventually lead to trouble as well as shortening the battery life, therefore, the battery should, under such a condition, be recharged as soon as possible. (Fig. 5-41)
- Inspecting the electrolyte level.
  If the electrolyte level falls below the LOWER LEVEL, remove the filler cap with a screw driver or an appropriate tool and fill the battery to the UPPER LEVEL with distilled water. Do not fill beyond the UPPER LEVEL.
- Whenever the vent pipe is removed during recharging, it must be reconnected when the battery is installed. Care should be exercized not to restrict the opening.



① Charger ② Battery
Fig. 5-42.

4. Battery charging procedure
   a. Connection to Charger (Fig. 5-42)
      Connect the positive ⊕ terminal of the battery (colored red) to the positive terminal of the charger, and the negative ⊖ battery terminal to the negative terminal of the charger. (Fig. 5-42)

When more than one battery is to be charged at once, they should be connected in series, as shown in Fig. 5-43.

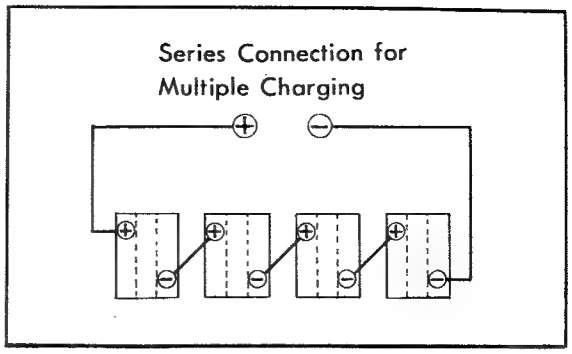


Fig. 5-43.

NOTE :

When series charging more than one battery, the charger voltage must be the sum of the battery voltages. For example, to charge three six-volt batteries, the charger must have an output voltage in excess of 6+6+6 or 18 volts.

b. Charging (Refer to the section 6.3.C)

Type	12N12A-4A
Voltage (V)	1.2V
Capacity at 10-hr rate (AH)	12AH
Charging current (A)	1.2A
Electrolyte	Specific gravity at 20°C (68°F) 1.260
	Volume of electrolyte required for filling (liters) 0.72 ℓ (0.190 U.S. gal/ 0.158 Imp. gal)

Specific gravity of electrolyte when fully charged at 20°C (68°F) 0.280

The charging time for a new battery is determined by the length of time in storage since the date of manufacture. (Date of manufacture is printed on the back of the specification booklet, enclosed with motorcycle battery).

The table shows the approximate charging times for new battery.

Duration of Storage	Duration of Charge
Lens than 6 mos.	10 to 20 hrs.
6 to 12 mos.	20 to 30 hrs.
Over 12 mor.	Over 30 hrs.

NOTE :

- During the charging operation, if the battery temperature exceeds 45°C (113°F), discontinue charging or decrease charging current to 1/2 of the specified value until the temperature recedes to a safe level. In which case, charging time must be increased.
- Be sure to charge the battery at the specified current.

- If the electrolyte level falls during charging, refill with distilled water to the upper level mark.

  Near the end of the charging period, adjust the specific gravity to between 1.270 and 1.290 (between 1.250 and 1.270 in tropical areas), and continue charging for two to three additional hours.

- Explosive hydrogen gas is discharged from the cells, therefore, do not charge batteries near any open fire. Always turn charger off before connecting or disconnecting batteries.

- After charging, add distilled or battery water to the cells to bring the electrolyte to the upper level mark.

  Tighten cell caps firmly and wash off with clean water any acid spilled.

- The battery is now ready for installation. When installing motorcycle battery, be sure not to pinch the battery vent tube. Explosion may result if the exhaust tube is blocked.

c. Preventative Maintenance

The battery is being recharged all the while the engine is running. Further, while running, the load such as the use of the winker, horn are placed on the battery (discharged), as the result, the battery is being discharged at the some time it is being recharged. In the long run, the discharge and the recharge is in balance. The system has been designed in this manner. Under certain condition when the balance is upset, then trouble develops.

To obtain maximum life from the battery, it is necessary to locate this trouble and take the appropriate action early.

The trouble to the battery are mainly external such as cracked case, broken terminal, disconnected lead wire. The battery condition, trouble, corrective action are shown in the following section 5.10 trouble shooting and corrective action (P143).

6. Vacuum Sealed Dry Charged Battery

The present dry battery in use (dry charged battery) will produce a certain amount of charge when the electrolyte is added, however, it will not be a 100% charge. Normally, it requires charging for a approximately 10 hours at a charging current of 10 – 15 hour rate to obtain full charge.

A recently developod new type battery (vacuum sealed dry charged battery) has simplified the servicing of the battery by eliminating the necessity for the initial charge. The Honda 250/350 is equipped with the new type battey.

The difference between the two type batteries are that, though the filler caps and other areas are sealed, after a period of extended storage, moisture will enter the dry charged battery and produce sulfation of the lead sponge, deteriorating the dry charge effectiveness. In contrast, the vacuum sealed dry charged battery is fully sealed so that it is not affected by the atmosphere, or long period of storage. Further, the plates are of different design which improves the preservation of the electrical charge. Each battery is sealed in vinyl package under vacuum and encased in a cardboard carton to prevent damage. During handling, care should be exercised not to damage the packing so that the vacuum sealing is rendered ineffective.

1. Comparison of the performances

a. The batteries when initially filled with electrolyte will produce the following electrical charge. (Fig. 5–44)

b. Comparison of affect to the charge capacity for storage. (Fig.5–45)

		Dry charged battery	Vacuum sealed dry charged battery
Capacity of 10 Hr discharge rate (%)		85	90
High rate discharge capacity test	Continuos dicharge test (%)	20～40	70～80
	5 sec. voltage test (%)	75～90	90

Fig. 5–44. Comparison table (I)

	Storage period		No Storage period	3 month	6 month	12 month
Dry charge bettery	Capacity of 10 Hr discharge rate (%)		85	80	75	65
	High rate discharge capacity test	Continuous discharge test (%)	20～40	15～35	15～30	10～20
		5–sec. voltage test (%)	75～90	75～90	70～85	65～80
Vacuum sealed bry charged battery	Capacity of 10 Hr discharge rate (%)		90	90	—	—
	High rate discharge capacity test	Continuous discharge test (%)	70～80	70～80	—	—
		5–sec. voltage test (%)	90	90	—	—

Note: The conditions are the same as for Fig. 5–44

Fig. 5–45. Comparison table (II)

2. Care during storage

   a. The battery is vacuum sealed to prevent its exposure to the outside air, therefore, the seal should not be broken until ready for use. Battery stored with its seal broken will have its plates exposed to the air, causing chemical action to take place on the battery plates which will deteriorate the initial charging rate. These batteries will then require charging on the charger before use, as required for the dry charge batteries.

   b. The batteries should be stored without unpacking carton in a dark, dry, cool place where the temperature is constant and does not exceed 49°C (120°F).

3. Instruction before use

   a. When removing the battery from the cardboard carton, gently lift out the sealed edge.

   b. Inspect the battery to make sure that the seal (plastic bag is sticked to the battery), if can be assumed to be in good condition. This battery will be ready for use after filling with electrolyte (specific gravity 1.260 – 1.280 @ 63°F or 20°C).

   c. However, if upon inspection, the seal is as shown in Fig. 5–46, it can be assumed that the seal had been broken and, therefore, the battery should be charged in accordance with the Section 4 after filling with electrolyte.

   d. Upon completing the battery installation, the initial starting should not be made with the starting motor, but with the kick starter. The reason for this is to allow sufficient time for the battery to build up to full charge, otherwise, the heavy current that the starting motor would draw from the battery would impose a rapid drain in the event that the battery is not fully charged and would have a damaging effect.

   e. In cold weather such as −1°C (30°F) or lower, the instant charging function can be greatly improved if the electrolyte is warmed to about 30°C (85°F) before filling the battery.

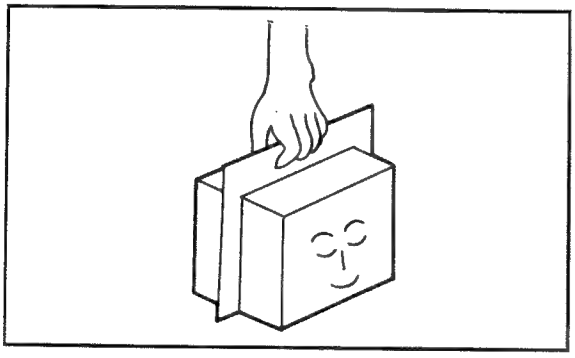


Fig. 5–46A. Aluminum foil packing tight on the battery

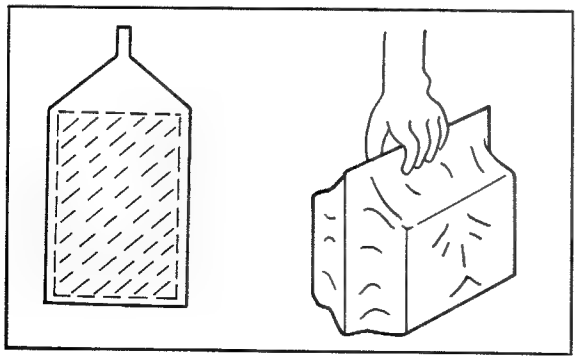


Fig. 5–46B. Aluminum foil packing loose on the battery

4. Instruction during use

   After adding the electrolyte to the battery, the battery can be used in the same identical manner as the present dry cell battery.

   a. When the electrolyte level drops to the lower level mark, add distilled water to bring the electrolyte level to the upper level mark. Using the battery with insufficient electrolyte, so that the plates are exposed, will cause sulfation of the plates; resulting in damage to the battery.

   b. During the use of the battery, if the specific gravity of the electrolyte should drop below 1.200 at 20°C (68°F), the battery should be charged as soon as possible. The use of the battery in a discharged condition (indicated by dimming of the lights) will shorten the service life of the battery.

   c. Exercise care that the vent tube is not blocked or pinched when installing the battery.

5.5 ELECTRIC STARTER

A. Starting Circuit

A push button type starter switch is located on the right handle bar which engages the solenoid switch in the starter circuit to close the starting circuit. Approximately 120A current flows from the battery to turn the starting motor.

The starting motor is mounted on the front of the crankcase and drives the engine through a starting clutch and chain. (Fig. 5-47~49)

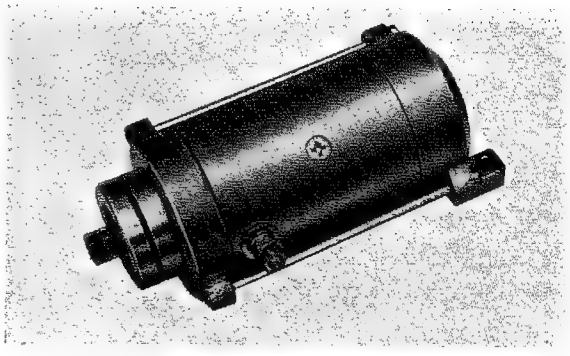


Fig. 5-47. Starting motor

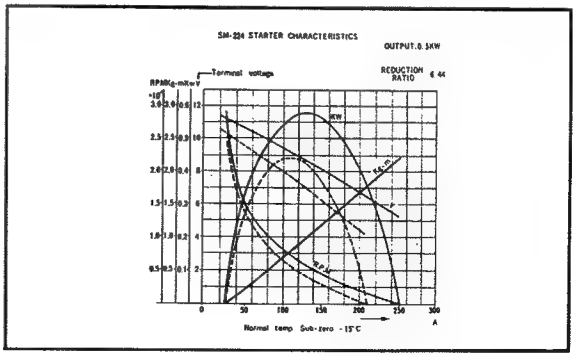
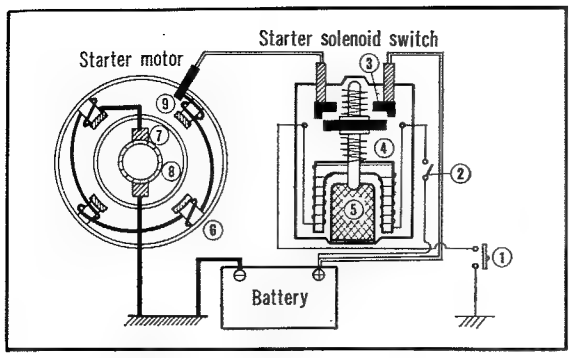


Fig. 5-48.



① Starter button switch ② Ignition switch
③ Contact unit ④ Excitation coil ⑤ Plunger ⑥ Pole
⑦ Brush ⑧ Armature ⑨ Field coil
Fig. 5-49. Starter circuit diagram

B. Starting Motor Characteristics

A small powerful electric motor is required to perform the starting function, therefore, most commonly used series type 12V electric motor is used which has a capacity of 0.45 KW. This motor is powerful enough to enable starting even in subzero temperature.

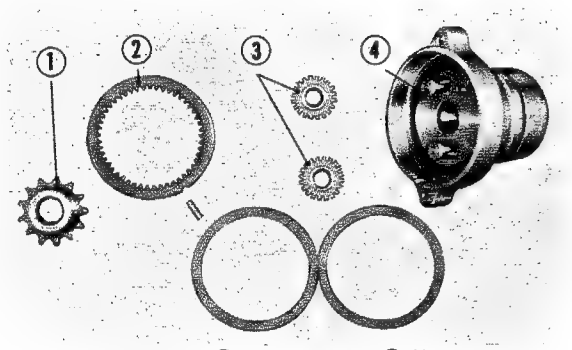
Starting motor specification

1.	Rated voltage :	12V
2.	Rated output :	0.45KW
3.	Rated operation :	30 seconds
4.	Reduction ratio :	6.44
5.	Direction of rotation :	Clockwise (Viewing into the pinion)
6,	Weight :	2.7 kg (5.95 lb)

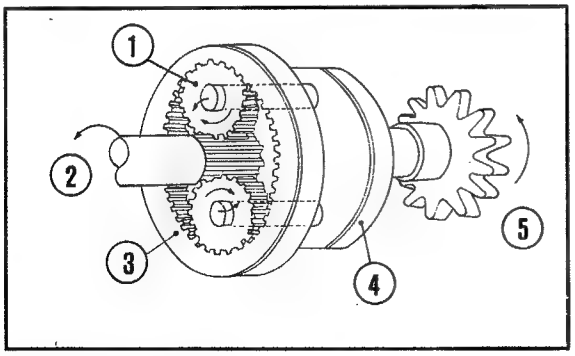
Starter performance

Item	without load	with load	Stalling load
Voltage	11V	9V	5V
Amperage	35A Max	120A	280A

RPM at sprocket shaft	1,700 Min	500 Min
Torque at sprocket shaft	0.7 kg-m (5.06 ft.lb) Min	1.8 kg-m (13.02 ft.lb) Min



① Starter sprocket ② Internal gear ③ Planetary gear
④ Sprocket shaft
Fig. 5-50. Starting motor reduction gear components



① Planetary gear ② Motor shaft ③ Internal gear
④ Sprocket shaft ⑤ Starting sprocket
Fig. 5-51.

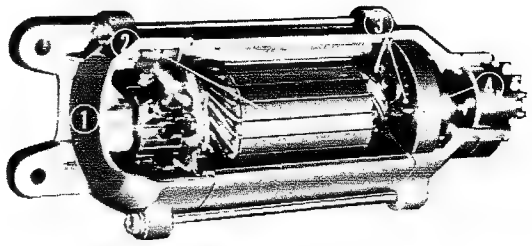
C. Starter Reduction

A mechanical reduction system is required to reduce the speed of the starter to provide the necessary torque for turning over the engine for starting. The primary reduction is accomplished by the planetary reduction gear which is both light and compact : the secondary reduction is by the sprocket and chain. (Fig. 5-50, 51, 52)

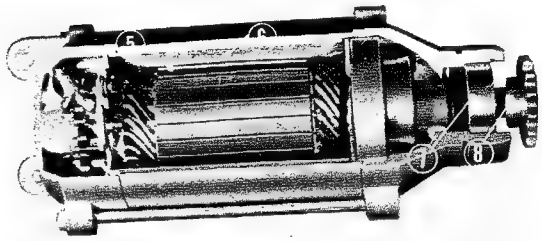
Primary reduction ratio
(planetary gear) ..... 6.44 : 1
Secondary reduction ratio
(sprocket and chain) ..... 2.77 : 1
Total reduction ratio .....17.84 : 1

The starting motor is not in constant use, therefore, wear to their component parts is very rare, however, if unusual noise should develop during its operation, disassemble the starter and check the following points.

1. Condition of the carbon brushes and commutator.
2. Excess accumulation of carbon particles. (remove with compressed air)
3. Check for adequate lubrication in the gear case.



① Commutator ② Armature ③ Planetary gear
⑧ Internal gear
Fig. 5-52A.



⑤ Pole coil ⑥ Field coil ⑦ Ball bearing
⑧ Starter sprocket
Fig. 5-52B.

D. Removal

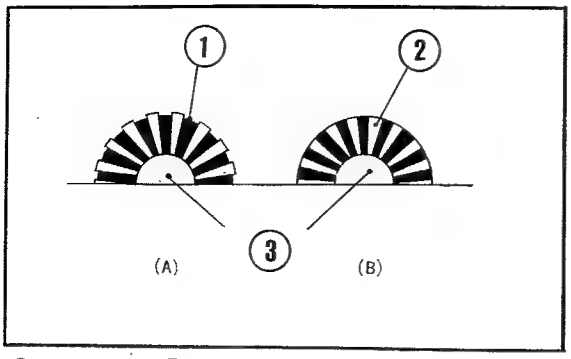
1. Remove the left crankcase cover.
2. Disconnect starting cable at the terminal.
3. Unscrew two 6 mm bolts from the right side and while removing the starting motor, disconnect the chain from the sprocket.

NOTE :

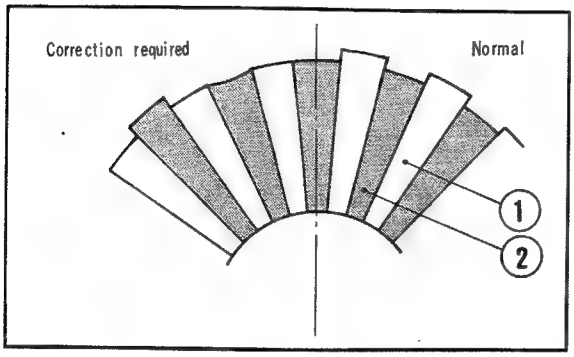
Do not forcibly remove, as it may cause damage to the crankshaft.

E. Servicing

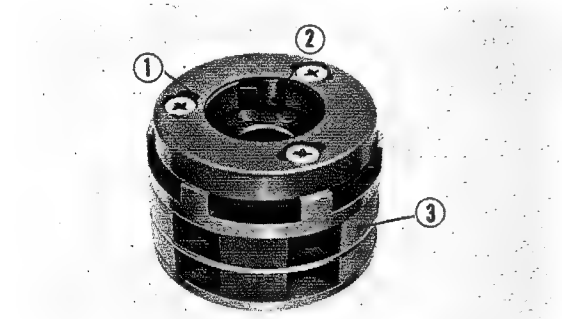
1. Carbon brush removal
   a. Unscrew the two 5 mm bolts and separate the end bracket from the motor, unscrew the 3 mm screw attaching the brush holder to the field coil and remove the brush holder bracket.
   b. Remove the carbon brush from the brush holder on the positive side and from the negative side, disconnect the brush holder and then pull out the brush.
   c. Perform the installation in the reverse order of removal.
   d. During assembly, make sure that the brush lug and the positive side do not come in contact with the inside surface of the end bracket, also, assure that the lead does not interfere with the action of the brush.
   e. The starting motor is completely sealed and designed to be waterproof, therefore, exercise care that the O-ring and gaskets are not damaged during installation.



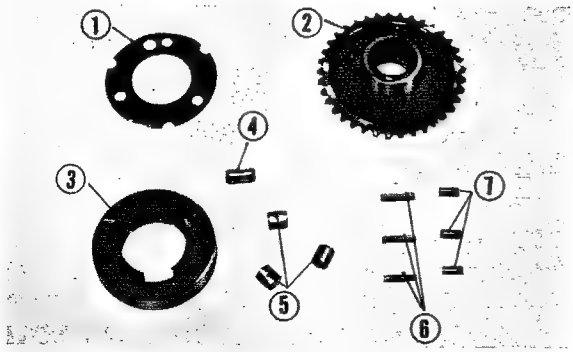
① Mica piece ② Commutator (copper) ③ Motor shaft
Fig. 5-53. Sectional view of commutator



① Commutator ② Mica
Fig. 5-54. Commutator correction



① Starting clutch outer ② 10.2×11.5 roller
③ A.C. generator rotor
Fig. 5-55. Starting clutch



① Starting clutch side plate ② Starting sprocket
③ Starting clutch outer ④ 8×18 knock pin
⑤ 10.2×11.5 roller ⑥ Starting clutch roller spring
⑦ Starting clutch roller spring cap
Fig. 5-56.

2. Commutator

The normal condition of the commutator is as shown is Fig. 5-53 (A) and after a period of use, the copper contacts become worn to a shape shown in (B). When this condition develops, the commutator must be restored to the original condition. This rework (undercutting the mica) requires special skill and tooling, therefore, it should be referred to a specialty shop. (Fig. 5-53, 54)

Whenever the commutator is worn to an extent that the difference between the copper contact and the mica is greater that 0.3 mm (0.012 in), the rotor should be serviced.

F. Starting Clutch

The function of the starting clutch is to transmit the torque of the starting motor to the crankshaft but prevent the torque of the crankshaft from motorizing the starting motor. (Fig. 5-55, 56)

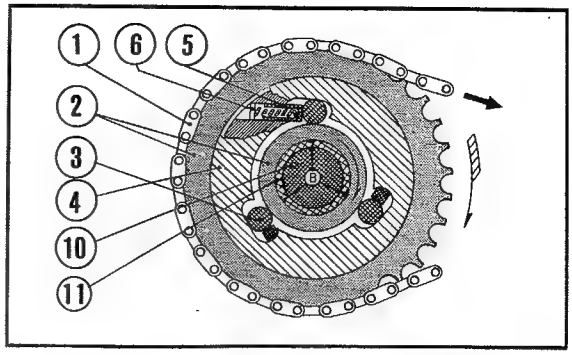
1. When the starting motor is operated, the following sequence of events take place.
   a. The chain is driven in the direction of arrow (a) in the Fig. 5-57.
   b. As the sprocket revolves, the rollers move into the narrowing space between the clutch outer and the starting sprocket as indicated by arrow (b) and the clutch outer starts revolving together with the starting sprocket, likewise with the dynamo rotor which is assembled to the clutch outer.
   c. The rotor is fixed to the crankshaft by a 4 mm key and in this way, the rotation of the clutch outer is transmitted to the crankshaft.
   d. The starting clutch roller spring and cap permits the rollers to affect a smooth locking between the starting sprocket and the clutch outer.

2. When the engine starts the following sequence of events will take place.
   a. The crankshaft RPM will exceed the speed of the sprocket.
   b. The rollers are moved toward the wider space between the starting sprocket and the clutch outer by the centrifugal force and the friction, overriding the force of the spring. This causes a discontinuity between the starting motor and the crankshaft power transmission.

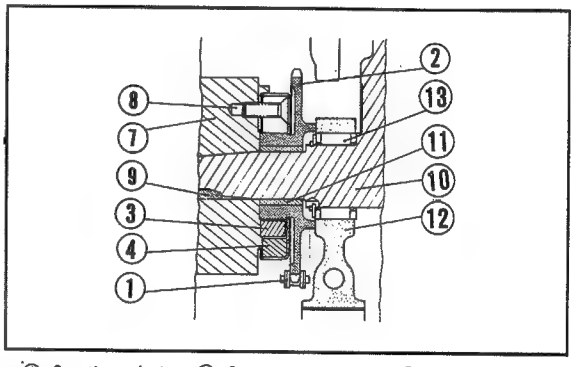
3. Lubrication oil which has been supplied to the left crankshaft main bearing flows through the groove of the starting sprocket bushing and returns to the crankcase by the clearance between the clutch outer and the AC dynamo. (Fig. 5-57, 58)

4. Servicing

   The serviciability of the starting clutch is dependent upon the function of the roller, therefore, exercise the following precautions when handling the rollers.
   a. Use only the specified silicon grease as lubricant on the rollers.



① Starting chain ② Starting sprocket ③ Roller
④ Clutch outer ⑤ Roller spring cap ⑥ Roller spring
⑩ Left crankshaft ⑪ 21mm bushing
Fig. 5-57.



① Starting chain ② Starting sprocket ③ Roller
④ Clutch outer ⑦ A.C. generator rotor
⑧ Cross-point head screw ⑨ Woodruff key
⑩ Left crankshaft. ⑪ 21 mm bushing ⑫ Bearing holder
⑬ Roller
Fig. 5-58.

b. Clean the rollers in gasoline and dry through before applying a light coating of silicon grease to entire surface of the rollers before assembly, using a fine hair brush.

c. Characteristics of the silicon grease

(1) Little change in quality from low temperature through high temperature.

(2) Temperature causes very little change to the friction coefficient (on coated metal surface).

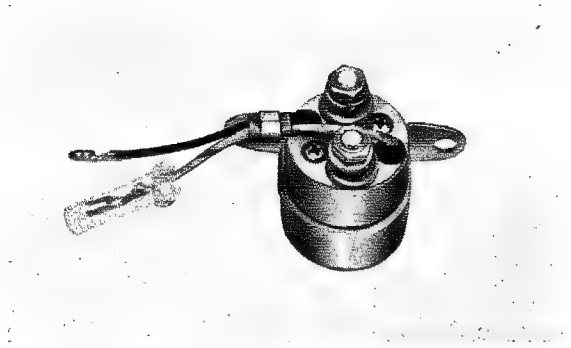
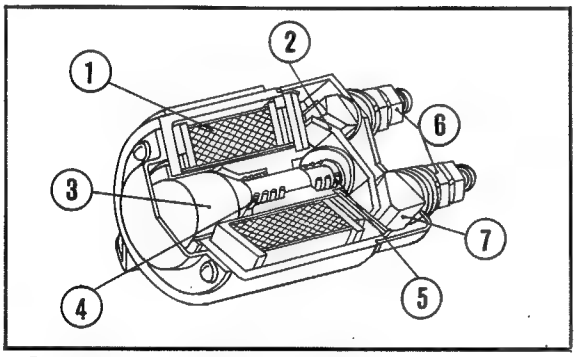


Fig. 5-59. Starter solenoid switch



① Magnetic coil (primary coil) ② Contact (operating side)
③ Plunger ④ Return spring ⑤ Contact return spring
⑥ Terminals ⑦ Contact (fixed side)
Fig. 5-60.

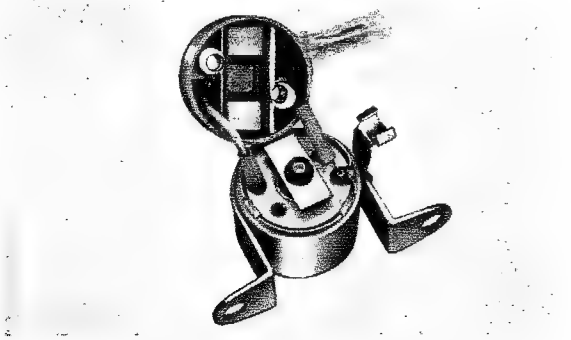


Fig. 5-61. Starter solenoid switch with the cover opened

G. Starter Solenoid Switch

A large electrical current is required to operate the starter. This will require a large cable, however, the length of this cable must be kept as short as possible to reduce the electrical resistance.

One convenient way to accomplish this is to install a starter solenoid (electromagnetic switch) at a convenient location between the battery and the starter and another small starter switch where it is easily accessible.

By the use of this configuration it is possible to control the flow of large current remotely by using only a small current. (Fig. 5-59, 60)

1. Operating principle

a. Depressing the starter switch energizes the magnetic coil of the starter solenoid switch, sets up a magnetic field, and draws the plunger into the center of the coil, overriding the spring compressive force.

The moving contact plate attached to the end of the plunger produces a bridge across the starter cable terminals and the starter solenoid by contacting the two contact points. (Fig. 5-61)

b. This closes the starter circuit and allows heavy current to flow to the starter. As long as the starter switch is held closed, the starter solenoid will remain energized and the heavy current will continue to flow from the battery to the starter.

2. Malfunction

a. When the starter switch is depressed a "Click" in the starter solenoid is heard; this indicates the movement of the plunger and closing of the terminal contacts.

b. If the starter does not operate even the starter solenoid is energized, it is probable that the starter circuit terminal contacts are burnt and preventing the flow of battery current to the starter. In such a case, disassemble the starter solenoid and clean the contact areas with file or sandpaper so that good contact is being made.

When the points are not burnt but covered with oil film or moisture, check the condition of the O-ring and if damaged, replace with a new part.

c. When the starter solenoid is not energizing, check for the following conditions.

a) Starter switch defective
b) Defective solenoid coil
c) Plunger binding
d) Defective wiring

5.6 SAFETY DEVICES

A. Horn

There are three different types of horn in common use. They are the flat, spiral and the trumpet types. The spiral type horn is used on the Honda 250/350. (Fig. 5-62)

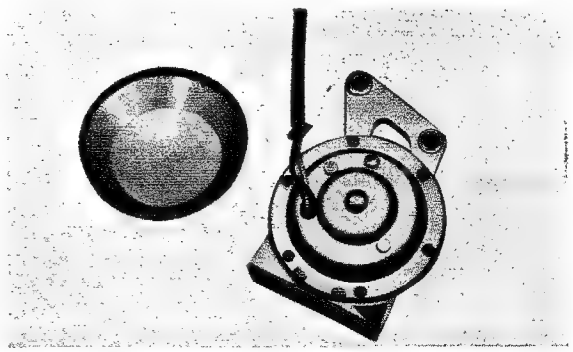
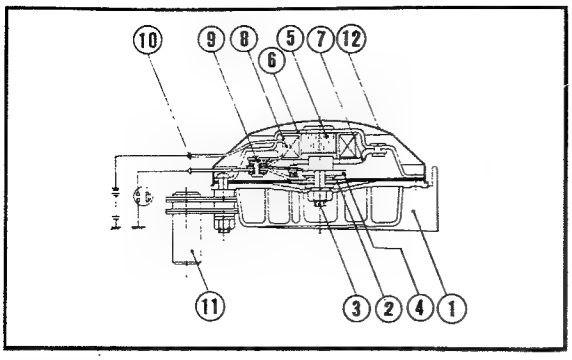


Fig. 5-62. Horn



① Curling horn ② Diaphragm ③ Pole B ④ Armature
⑤ Pole A ⑥ Case ⑦ Core plate ⑧ Coil
⑨ Contact assembly ⑩ Coupler (black) ⑪ Horn clamp
⑫ Cover
Fig. 5-63. Horn construction

Operation principle and construction of the horn. (Fig. 5-63)

(1) Curling horn	Amplification and radiation
(2) Diaphragm	Vibrating plate (to produce sound)
(3) Pole B	Connector between armature and vibrating diaphragm
(4) Armature	Core (source of vibrating)
(5) Pole A	Core
(6) Case	Case for housing the component parts
(7) Core	Core
(8) Coil	Generate magnetic field to attract the core
(9) Contact assembly	Circuit breaker
(10) Terminal	Electrical connection
(11) Clamp assembly	Attachment bracket (Made of spring steel so that the sound will not be affected by the frame
(12) Cover	Appearance consideration and protection

The principle of operation is as follows. When the horn switch is closed, the current flows to the terminal (10), Coil (8), Contact assembly (9) (contact Plate B, contact points, contact Plate A), terminal (10) and then the battery.

As the current flows through the coil, a magnetic field is set up, pulling the armature.

The armature which is connected to the diaphragm by the pole, causes the diaphragm to flex and at the same time opens the contact points to disrupt the horn circuit.

This permits the diaphragm to snap back due to the tension of the diaphragm and again closing the contact points, which energizes the coil to restart the sequence of the cycle.

The cycle is repeated continuously as long as the horn switch is held closed. This causes the diaphragm to vibrate, producing the sound of the horn. The curling horn amplifies this sound to the proper loudness.

B. Servicing

1. The component parts of the horn have been accurately adjusted and assembled with test equipment, therefore, do not attempt to disassemble the horn.
2. Do not permit water or dust to interior of the horn through the opening during washing as this will render the horn inoperative.
3. If the horn is not operating properly due to loss of loudness or change in the tone, disconnect the wires at the terminal and connect the lead from the fresh battery direct to the horn terminal. Restoration of the proper sound indicates that the battery voltage is low, horn switch is defective, or that the electrical wiring or connection is defective. If the above procedure does not correct the problem, remove the horn cover and adjust the horn by turning the adjusting screw slowly a notch at a time in both direction until properly adjusted (there are 20 notches for each turn of the adjusting screw).

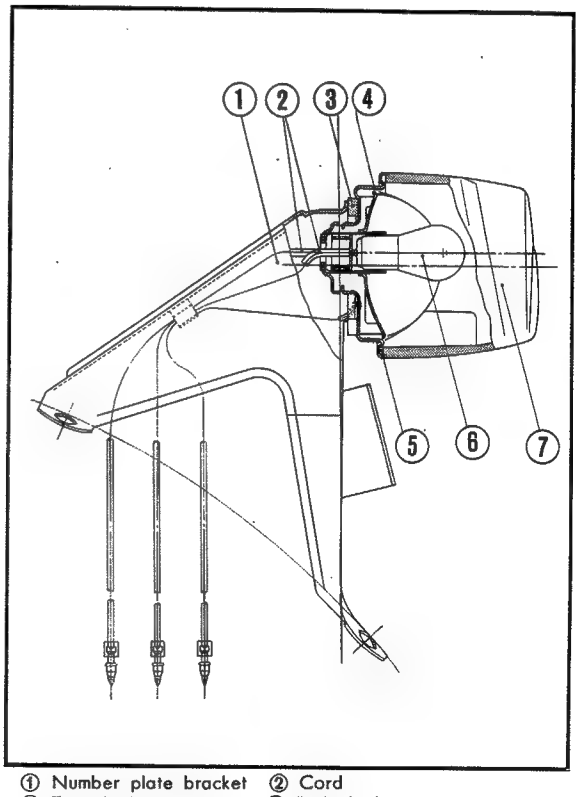
   Turning in the clockwise direction will increase the loudness and turning counter clockwise will reduce the loudness and eliminate the vibrating noise. Do not turn the adjusting screw more than two turn in either direction.

C. Tail-Stoplight

The tail-stoplight incorporates two filaments within a bulb. (Fig. 5-64, 65)

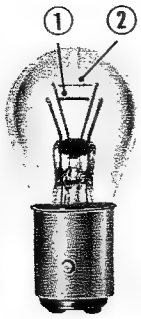
Bulb specification 12V-23/7W

When replacing bulbs, always use a bulb of the specified rating.

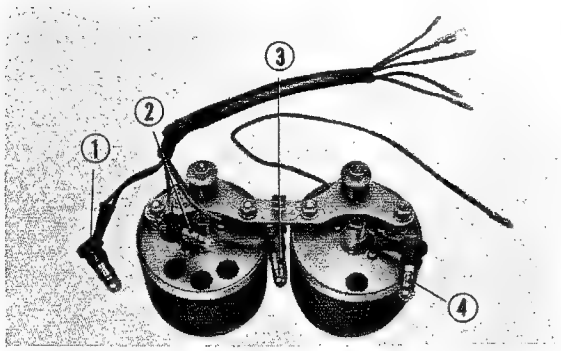


① Number plate bracket ② Cord
③ Taillight base packing ④ Taillight base
⑤ Taillight lens packing ⑥ Tail/stop light bulb
⑦ Taillight lens

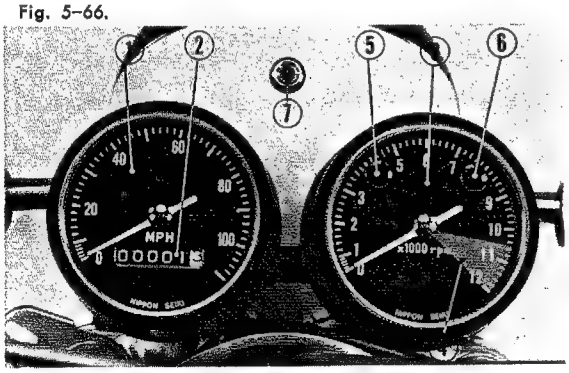
Fig. 5-64. Cross-section of tail/stop light



① Filament for stop light ② Filament for tail light
Fig. 5-65.



① Neutral indicator lamp bulb ② Tachometer lamp bulb
③ Turn signal indicator bulb ④ Speedometer lamp bulb
Fig. 5-66.



① Speedometer ② Odometer ③ Tachometer
④ Red zone ⑤ Neutral pilot lamp
⑥ Turn signal pilot lamp ⑦ High beam indicator lamp
Fig. 5-67.

D. Pilot Lamp

The following pilot lamps are installed in the speedometer and tachometer. (Fig. 5-66)

1. Neutral indicator lamp is at the left of the tachometer
2. Turn signal indicator lamp is to the right of the tachometer
3. There are also illuminating lamps for the respective meters

   All of the bulbs are 12V-3W

E. Speedometer/Tachometer

With the increase in speed of the motorcycle, the vibration and also the vibration transmitted from the road surface become greater. If this vibration is transmitted directly to the tachometer, the control spring will set up a resonance, and the shaft will be exposed to excess wear and the indicator needle will be subject to oscillation.

For this reason, the Honda 250/350 tachometer and speedometer have been designed light in weight to minimize vibration and further, the meter cases are made of synthetic material (ABS, acrylic resin) to further absorb any residual vibration.

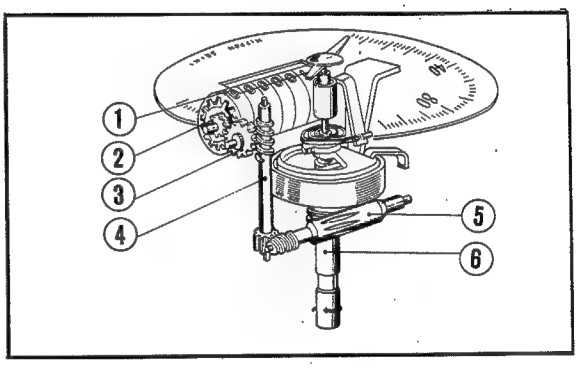
The speedometer is of a magnetic coupling of a needle indicating type. The rotation of the wheel is transmitted by the speedometer shaft to the speedometer in the definite ratio of the wheel speed.

The tachometer also is of the magnetic coupling needle indicating type. The rotation of the cam shaft is transmitted in definite ratio by the tachometer cable to the tachometer. (Fig. 5-67)

F. Characteristics of the Speedometer/ Tachometer

1. To prevent the transmission of the frame vibration and the flexible shaft vibration to the speedometer needle indicating shaft, the needle indicating shaft is suspended independently from the magnetic shaft.
2. A special damping feature is used by employing silicone oil on the needle indicating shaft to eliminate any residual vibration which is not eliminated by the above paragraph.
3. The meter case is made of lightweight synthetic material which will also absorb vibration, reducing the vibration which will be transmitted to the meter, and because of its lightness, the tendency for the case to oscillate is minimized, further reducing the vibration.
4. The meter case, glass, and the dial is made of an integral synthetic resin unit eliminating any possibility of water leaks.
5. Speedometer and tachometer are independent, with both having wide angular indicating dials, making it easy to read. Further, it adds sportly appearance.

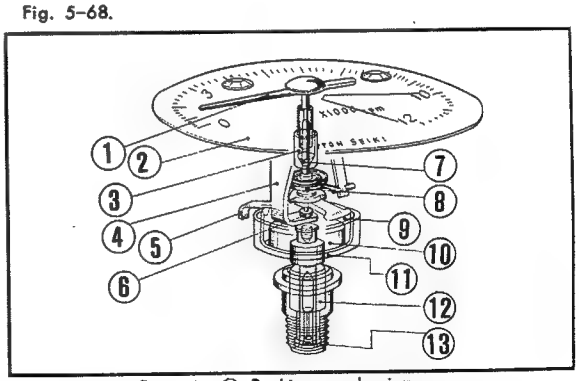
The speedometer system is designed so that the rotation of the front wheel is transformed in the gear box so that the travelling distance of one kilometer will provide 1,400 rpm of the flexible speedometer shaft. On the other hand, the rotation of the camshaft is further reduced when converted to the flexible shaft speed. The reduction ratio between the tachometer shaft and the crankshaft is 3 : 20. (Fig. 5-68)



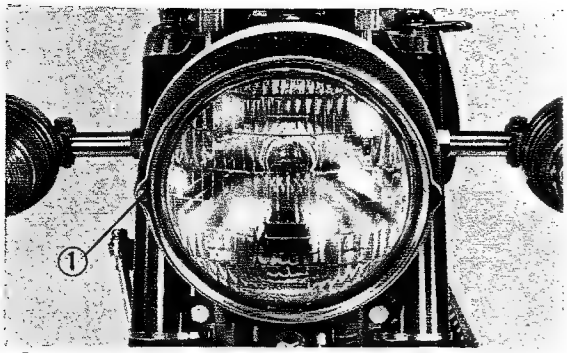
① Total ② 5th gear ③ 4th gear ④ 3rd shaft
⑤ 2nd shaft ⑥ 1st shaft (magnet shaft)
Fig. 5-68.

The odometer is constructed as shown in Fig. 5-69. A worm gear is cut on the magnet shaft and the rotation is transmitted to the 2nd shaft and to the 3rd shaft and further transmitted from the 4th shaft to the 5th shaft. The respective wheel of the odometer has number from 0 to 9 in sequence.

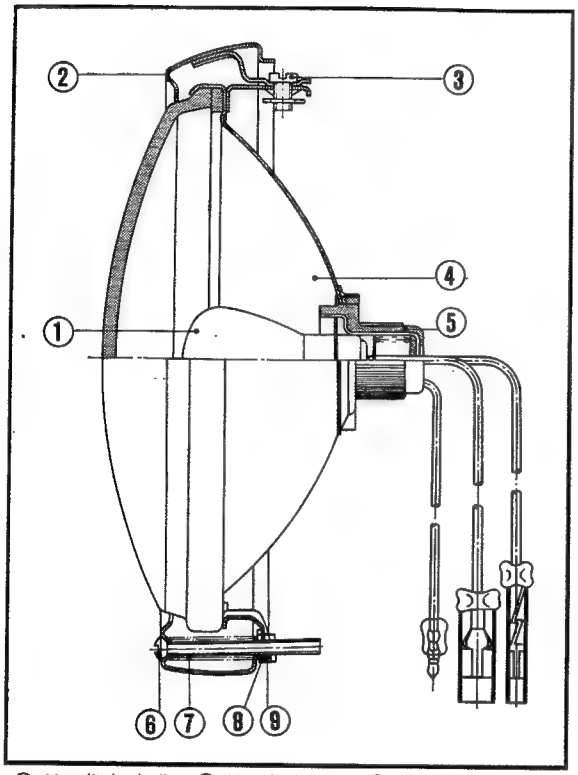
The odometer is geared in such a manner that complete revolution of any of the wheel will move the adjacent wheel of the higher digit by 1/10 revolution. (Fig. 5-69)



① Pointer ② Dial ③ Braking mechanism
④ Bearing bracket ⑤ Stopper ⑥ Pointer bearing
⑦ Pointer shaft ⑧ Braking spring ⑨ Induction disc
⑩ Magnet ⑪ Case ⑫ Magnet bearing
⑬ Magnet shaft
Fig. 5-69.



① Adjusting screw
Fig. 5-70. Headlight



① Headlight bulb ② Headlight rim ③ Unit holder screw
④ Headlight unit ⑤ ⑥ Beam adjust screw
⑦ Beam adjust spring ⑧ Washer ⑨ Beam adjust nut
Fig. 5-71. Headlight construction

G. Headlight

Headlight performs an important function during night riding.

The Honda 250/350 employs a semi-sealed type headlight. This type is so improved that the deterioration and the variation to the light intensity is hardly non-existent during the life for the bulb. (Fig. 5-70, 71)

A good headlight must fully satisfy the following requirements.

1. Sufficient brightness and accurate intensity
2. Should be both waterproof and dustproof
3. Fully vibration proof
4. Available switching between high and low beam

The headlight beam is adjustable in both vertical and horizontal direction.

Horizontal adjustment of the headlight is made by the adjusting screw at the front of the headlight. Turning this screw clockwise will move the beam toward the left of the road and the beam will move toward the right if turned counter-clockwise. Adjustment in the vertical direction is made by loosening the headlight mounting bolts and tilting the headlight assembly. The general export type can be adjusted only in the vertical direction; the adjustment being made with the adjusting screw.

H. Flasher Relay

FLASHER RELAY OPERATION

In the flasher relay, charging and discharging currents of the condenser and load current which flows to the flasher bulb are skillfully activated.

In the flasher relay, the point is repeatedly closed and interrupted by the relay by which the charging and discharging currents of the condenser and load current which flows to the flasher bulb are skillfully actuated. In Honda 250/350, this condenser system flasher relay is used. (Fig. 5-72)

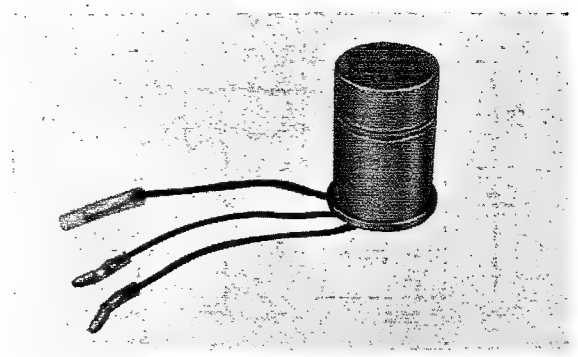


Fig. 5-72. Flasher relay

In the flasher circuit shown in Fig. 5-73, if the combination switch "CS" is closed, charging current flows from the battery to condenser "C" through voltage condenser coil "LV", i.e., whenever the key switch is closed, the condenser is always fully charged. (Fig. 5-73)

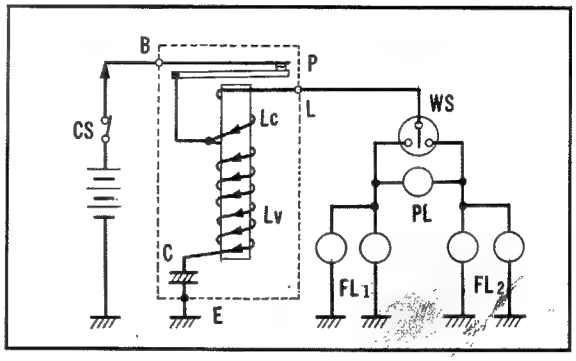


Fig. 5-73. Combination switch (CS) closed

In Fig. 5-74, when switch "WS" is turned to flasher lamp "FL_1" side, current flows to flasher lamp lights. (Fig. 5-74)

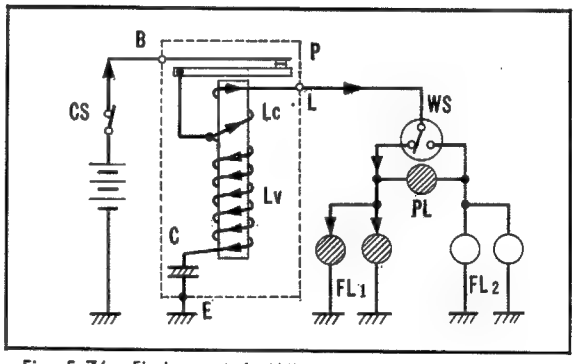


Fig. 5-74. Flasher switch (WS) closed (lights on)

The current which flows to the flasher lamp i.e., the current which flows to coil "LC" activates the coil ; thus, the point is opened by traction and the lamps are turned off. When the point is opened, and the condenser "C" discharging begins, current is almost discharged by the traction of the both "LC" and "LV" coils. (Fig. 5-75)

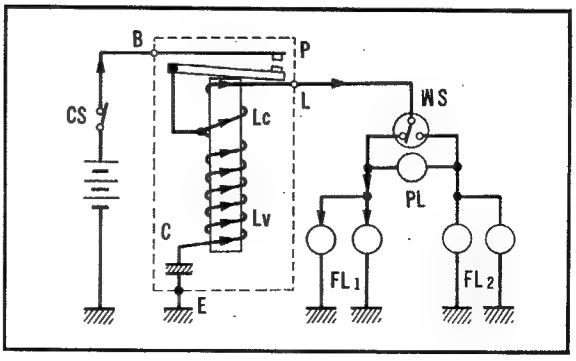


Fig. 5-75. Point (P) open (light off)

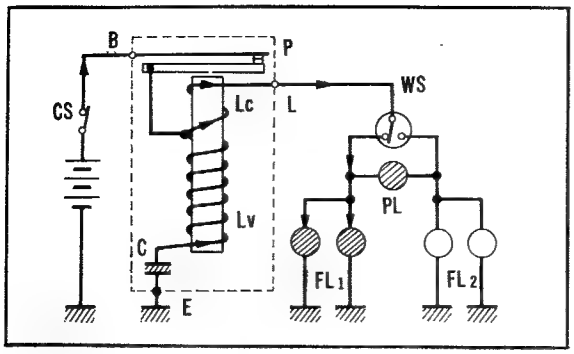


Fig. 5–76. Point (P) closed (light on)

When this discharging current is reduced, point "P" is closed under its own spring tension, charging current flows to coil "L", and load current is passed to coil "LC". These currents flow inversely, and for this reason, the traction does not work; thus, the lamp remains on as shown in Fig. 5–76.

However, the charging current which flows to coil "LV" decreases when condenser "C" becomes almost fully charged, the traction working on both coils is unbalanced, and the point is opened turning off the flasher lamp.

The above operations are repeated and the flasher continue to operate.

1. Always use a bulb with the rated capacity.
   12V–10W (General Export)
   12V–25W (U.S.A. Export)
2. This flasher is negative grounding only. If used for motorcycles designed with positive grounding, the flasher will break and will not operate.
3. The flasher unit case is grounded. Particular caution should be given to paint and rust on the installing portion; and when installing, it should be installed firmly.
4. When combination or flasher switch is turned on, a buzzer sounds. This does not mean that the flasher is broken.
5. When the flasher switch is turned on, if the lamp does not flash, flasher bulb breakdown is probable. Check the bulb immediately.

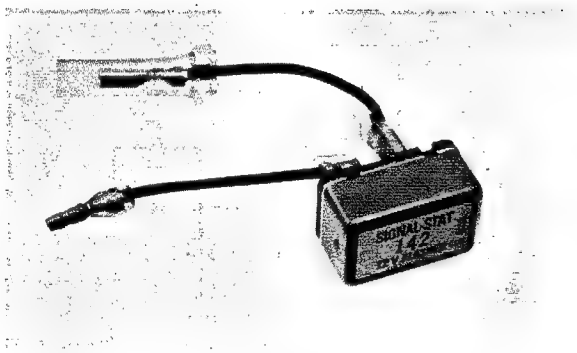


Fig. 5–77. Signal-stat flasher relay

NOTE:

On the Honda 250/350 for U.S.A. export, a flasher relay of another kind, SIGNAL-STAT 142 (12V flasher) is mounted. (Fig. 5–77) The above explanation on the condenser type flasher relay is applicable to the general export type.

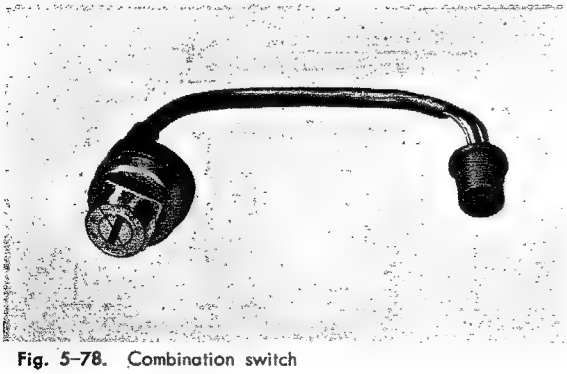


Fig. 5–78. Combination switch

5.7 SWITCHES

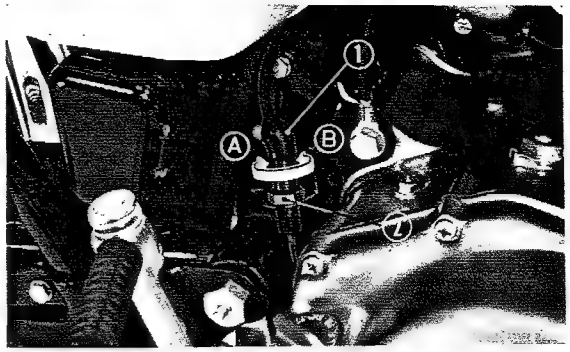
A. Combination Switch

This switch control the entire electrical circuit. Combination switch on the Honda 250/350 has the OFF, ON (riding) and the parking position. (Fig. 5–78)

B. Stoplight Switch

The stoplight switch is a pull-switch interlocked with the brake pedal. (Fig. 5-79)

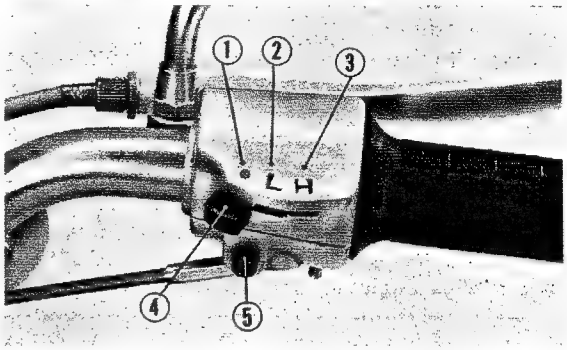
The adjustment is made by adjusting the position of the lock nut so that the stoplight turns on when the brake pedal is depressed to the point where the brake just starts to taken hold.



① Stoplight switch ② Lock nut
Fig. 5-79.

C. Starter/Lighting Switch

The starter-lighting switch is located on the right handle bar adjacent to the grip. Headlight control switch is at the top; the red position is for day riding (headlight does not come on), "H" is for high beam and "L" is for low beam. The starter switch button is below the headlight control switch. (Fig. 5-80)

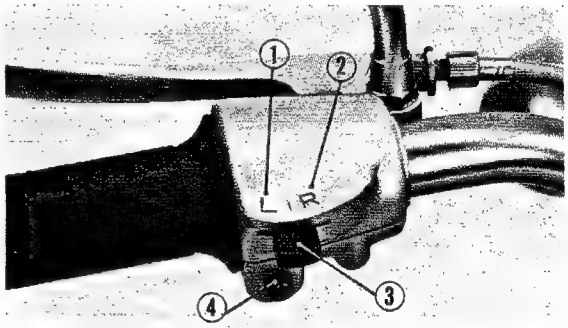


① "OFF" position ② "Low beam" position
③ "High beam" position ④ Headlight control switch
Fig. 5-80.

D. Winker-Horn Switch

The winker-horn switch is located on the left handle bar adjacent to the grip. The upper button is the winker switch and the lower is the horn button switch. (Fig. 5-81)

Majority of the switch troubles are either broken wire or poor switch contact.



① "Left turn signal" ② "Right turn signal"
③ Turn signal control switch ④ Horn button
Fig. 5-81.

E. Neutral Switch

The neutral switch to locate the neutral gear position is mounted on the end of the gear shift drum, sending signal to the neutral pilot lamp, thus facilitating safe and convenient driving. The switch contact point should be maintained dust-free. The neutral switch assembly is accessible when the left crankcase rear cover is detached. (Fig. 5-82)

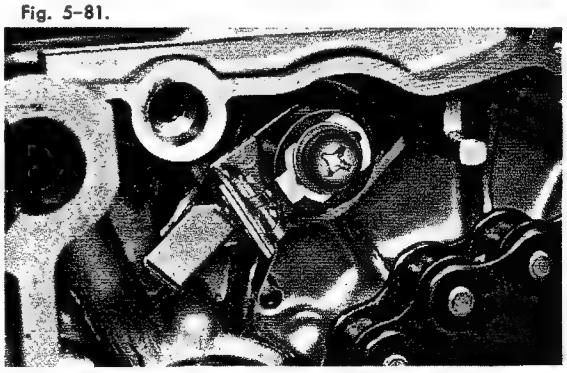


Fig. 5-82. Neutral switch

5.8 WIRE HARNESS

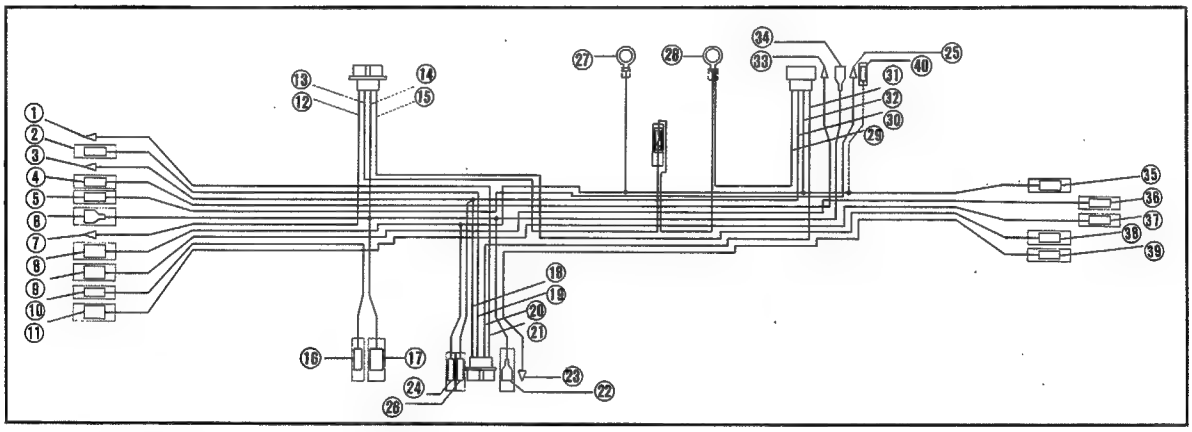
The wire harness is the artery between electric parts. It is important for electrical part functions, and if not properly maintained, it may cause fire. For this reason, make shift patching should be avoided. The wiring system consists of the wire harness, the backbone of the system, the auxiliary cord which connects two places, partially attached terminals, terminal sleeves, nipple cords, connectors, and other small parts.

The wire harness is combined in one bundle and required junctions are provided on the harness to ease and confirm the network of wires and cables which make up the main electrical circuits. In order to protect the main electrical circuits, the surface has been covered with mesh wire, waxed wire, or vinyl tubing.

The wire harness has the above described features; however on the other hand, inconveniences, (i.e., unfamiliar babel arranged in the harness, makes it difficult to inspect, or if one cable is broken, the broken wire cannot be replaced only by itself but the whole harness must be replaced) cannot be avoided. Thus, if only one cable is broken an additional separate cable must be attached to the wire harness.

Not only for the cables which make up the wire harness, but also for all other auxiliary cords, the core cables are colored for ease in identification.

On the positive battery terminal (+), there is a fuse to prevent hazardous occurrences such as excessive battery discharge, burning, etc., due to ground short-circuit of wiring or electric parts damage. However, when the AC generator coil and selenium rectifier are combined for the power supply, the selenium rectifier output terminal and battery should be directly connected to prevent selenium breaking, since if the engine is operated under the condition in which the fuse is removed or broken, the selenium rectifier plate may be broken due to high reverse voltarge. Therefore, only the rectifier output is connected direct to the battery (not through the fuse). (Fig. 5–82)



Lead color	Connection
① Light Green/Red	Neutral pilot lamp
② White/Yellow Tube	Lighting dimmer switch
③ Yellow	Lighting dimmer switch
④ Yellow/Red	Starter button switch
⑤ Grey	Winker switch
⑥ Black	Lighting dimmer switch/neutral pilot lamp
⑦ Brown/White	Speedometer lamp/lighting dimmer switch
⑧ Green	High beam lamp/head lamp/front winker lamp
⑨ Blue	R. front winker lamp/winker switch/ winker pilot lamp
⑩ Light green	Horn button switch
⑪ Orange	L. front winker lamp/winker switch/ winker pilot lamp
⑫ Red	Combination switch coupler
⑬ Brown/White	Combination switch coupler
⑭ Black	Combination switch coupler
⑮ Brown	Combination switch coupler
⑯ Light green	Horn
⑰ Black	Horn/ignition coil

Lead color	Connection
⑱ Yellow	AC generator coupler
⑲ White	AC generator coupler
⑳ Pink	AC generator coupler
㉑ Light Green/Red	AC generator coupler
㉒ Black	Stop switch
㉓ Green/Yellow	Stop switch
㉔ Green	Pointless regulator
㉕ Grey	Winker relay
㉖ Yellow	Regulator
㉗ Green	Battery ⊖ terminal
㉘ Red (red/white)	Battery ⊕ terminal
㉙ Red/white	Selenium rectifier coupler
㉚ Yellow	Selenium rectifier coupler
㉛ Pink	Selenium rectifier coupler
㉜ Green	Selenium rectifier coupler
㉝ Yellow/Red	Starter solenoid switch
㉞ Black	Winker relay/starter solenoid switch
㉟ Green	Taillight base
㊱ Blue	R. rear winker lamp
㊲ Orange	L. rear winker lamp
㊳ Brown	Taillamp
㊴ Green/Yellow	Stop switch
㊵ Green	Winker relay (not for SIGNAL–STAT winker relay).

5.9 SERVICE TESTER

Most troubles occurring in vehicles are concerned with troubles in electric parts. Those troubles pertaining to mechanical parts can be detected and the causes determined visually or by hand; however, for troubles with electrical parts, since the most important voltage levels or current values cannot be seen directly, it is difficult to judge the serviceability unless measuring devices or testers are used.

Attempting to determine witout using measuring devices is a waste of time, and satisfactory result cannot be obtained.

To determine electrical part troubles, it is necessary to use a proper measuring device and to do testing scientifically and quickly. Honda Motor Co., Ltd. recommends the service tester manufactured by Jonan Electric Co., Ltd. as the tester for Honda motorcycles.

The followings are just the outline of the handling instructions of the service tester. For further details, refer to the operating instruction leaflet attached to the service tester.

NOTE :

The explanation for usage is based mainly on the type ST-4B4 service tester, manufactured by Jonan Electric Co., Ltd. (Fig. 5-84)

A. Operating Instructsons

Power source : For the power source, a battery is used (either 6V or 12V). However, when testing coil only, use a 6V battery for a 6V coil and a 12V battery for a 12 coil,

Tachometer switch : The tachometer switch should be turned "On" only when using the tachometer; in all other cases, turn "OFF". (Fig. 5-84)

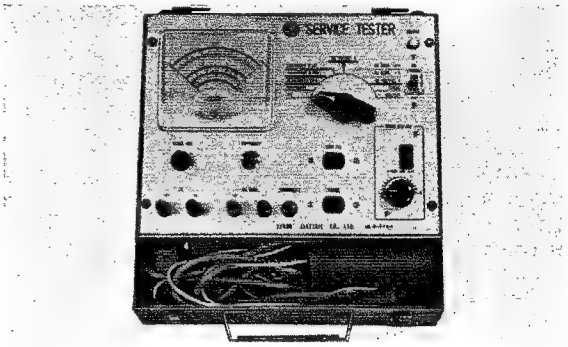


Fig. 5-84. Service tester

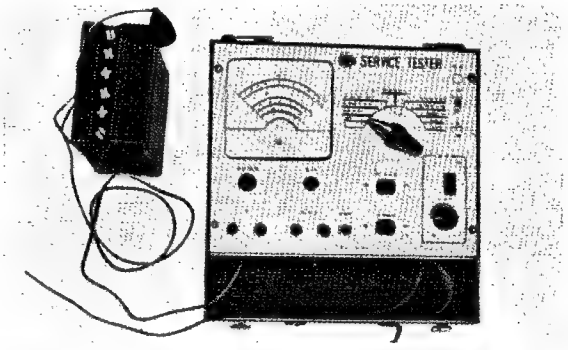


Fig. 5-85. Service tester ready in measuring

B. Meter Reading

The meter scale is graduated in various colors, and corresponding to the individual colors, the applicable colors are marked on the switch. When reading the scale, the scale can be easily identified, by following the same color. (Fig. 5-85)

On the switch selecting positions (resistance, insulation, DC voltage, DC amperage, and AC voltage), "$\times 100\,\Omega$" and "$\times\,\mu$F" are marked. These indicate the magnification and unit of numerals. (Fig. 5-86)

Example :
When measuring resistance, if the meter pointer indicates 0.5, it means that the resistance is $50\,\Omega$, if 2.5, it is $250\,\Omega$, since the mark is "$\times 100\,\Omega$".

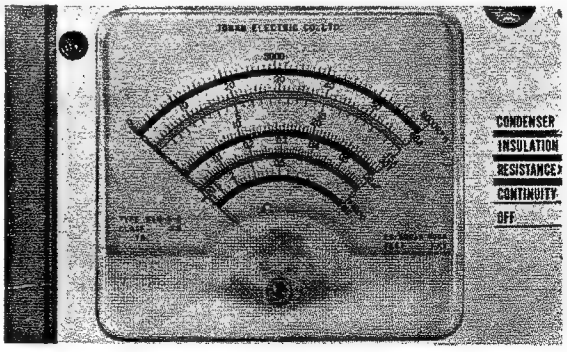


Fig. 5-86. Meter scale panel

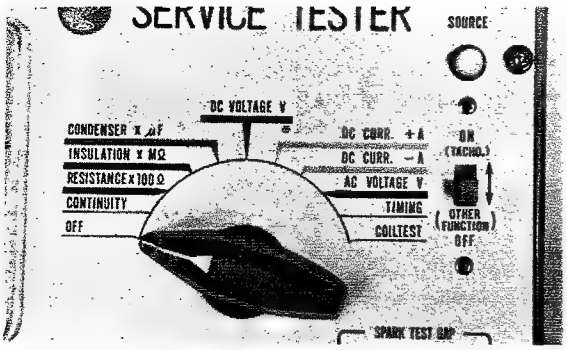


Fig. 5-87. Selector switch

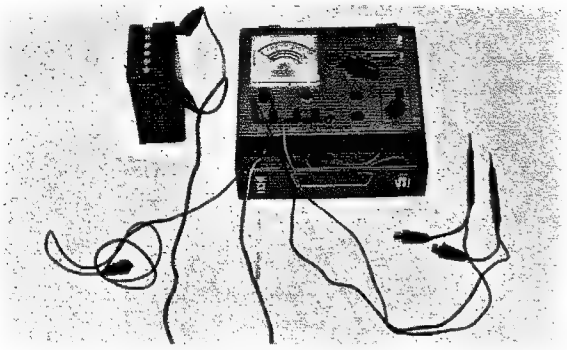


Fig. 5-88. Test lead wire connection

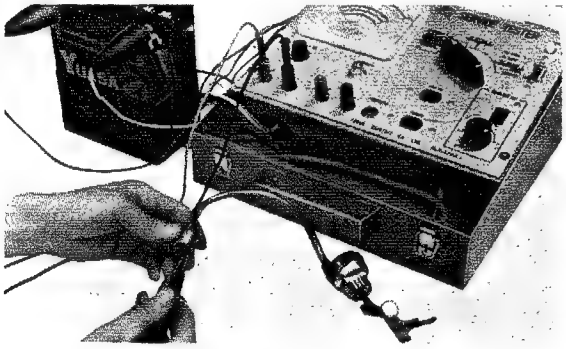


Fig. 5-89. Continuity test of the combination switch

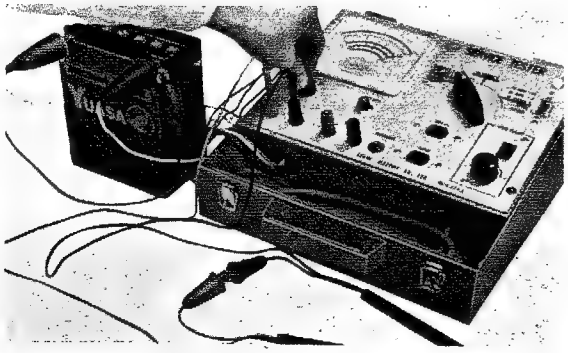


Fig. 5-90. Resistance zero adjustment

C. Usage by Item

1. Continuity (Power source required)

   a. Preparation

   (1) Connect red/white parallel cables, which come from the left side of the tester, to the battery (red is for positive (+) terminal and white is for negative (−) terminal).

   (2) Turn the switch to "Continuity" and the power source pilot lamp will light.

   (3) Next, connect test lead wire to terminal "×". (Fig. 5-88)

   b. Measuring

   (1) Contact the item to be measured with the end of the test lead wire. The continuity lamp is turned on if current flows; if not, the lamp does not light.

   The continuity test is applied to the testing of wiring, switching contact testing, contact of point, interrupting test, etc. (Fig. 5-89)

2. Resistance (Power source required)

   The resistance test is performed mainly when judging serviceability of the selenium rectifier.

   a. Preparation

   (1) Connect to the battery (power source).

   (2) Shift the switch to the position "Resistance".

   (3) Short-circuit terminal × test lead wire, turn the scale adjusting knob. and match the meter pointer to "O" on the black scale. (Fig. 5-90)

   b. Measuring

   (1) Contact the red/black lead wires to the socket of the rectifier. (Fig. 5-90, 91)

NOTE:

- When checking the selenium rectifier, both forward and reverse resistance values should be measured.

  Forward resistance 5-40Ω
  Reverse resistance 600Ω Min.

- When checking a motorcycle selenium rectifier, the measuring must be done after disconnecting the wiring.
- The following may be the causes for rectifier trouble.
  (1) Too high temperature use
  (2) High humidity
  (3) Excessive current
  (4) Harmful corrossive gas
  (5) A motorcycle is driven without battery.

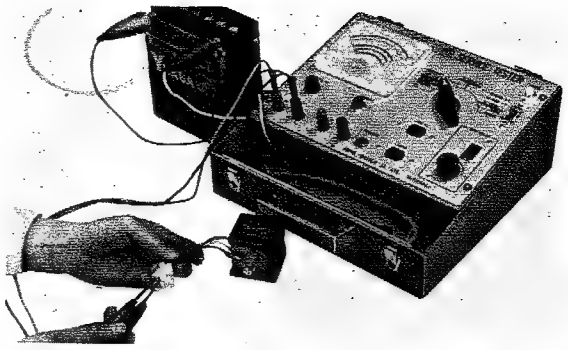
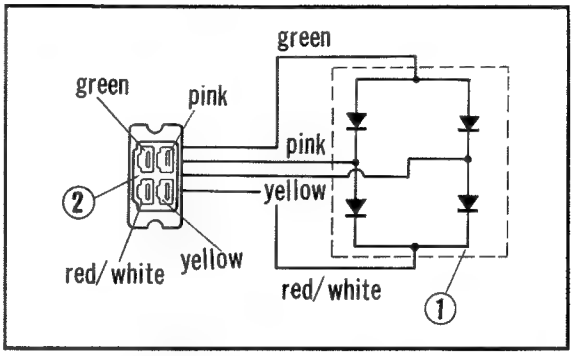


Fig. 5-91. Rectifier resistance measurement

- When the rectifier becomes defective the following troubles occur.
  (1) Magnetic force is reduced from the magneto.
  (2) Battery trouble (insufficient charging)
- Resistance of the ignition coil can be measured. Standard resistance is 5,000~10,000Ω.



① Rectifier stack ② Rectifier female coupler
Fig. 5-92. Rectifier wiring diagram

3. Insulating Resistance (Power source required) Usually the insulating resistance of a condenser is measured. (Fig. 5-93)

   a. Preparation
   (1) Connect the tester to the brttery. (Power supply)
   (2) Turn the switch to the position "Insulation".
   (3) Short-circuit the terminal X lead wire, and with the scale adjusting knob, match the pointer to "O" on the black scale.

   b. Measuring
   (1) Attach the test wire lead to the condenser.
   (2) The meter pointer will swing to the positive direction and return. When the pointer is almost stable, read the indication.
   M=Megohm
   5M or greater: Good
   5M to 1M: Satisfactory
   Less than 1M: Unsatisfactory

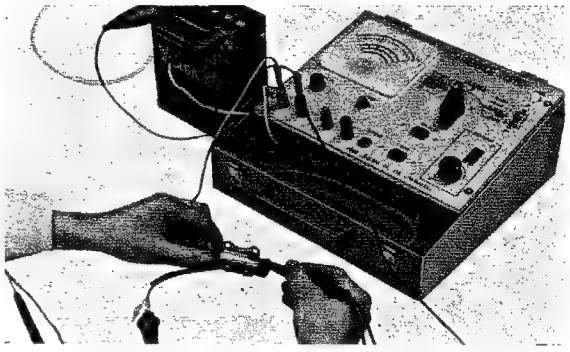


Fig. 5-93. Condenser insulation test

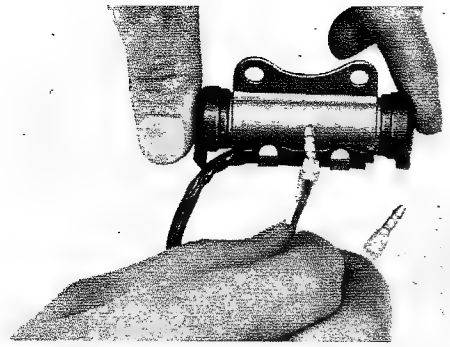


Fig. 5-94. Short-circuiting of the condenser

NOTE :

- Upon completion of measurement, the condenser terminal should be shortcircuited to discharge the charge accumulated in the condenser. If not, a shock may be expected to the touch. (Fig. 5-94)
- The condenser functions to hold electricity temporarily so that when the point is opened, the current does not spark. If the internal insulation is defective or the capacity is insufficient, the secondary voltage is lowered, the plug sparking is weakened, and the ignition becomes defective.

4. Condenser capacity (Power source required)
If the condenser is defective, electricity cannot be stored and the secondary voltage lowers. Accordingly, effective sparking is not made. Test the condenser following the instructions as indicated below :

   a. Preparation

      (1) Connect to the battery (Power source)
      (2) Setting the switch to "resistance", perform the scale adjustment in the same manner as for resistance measurement.
      (3) Turn the switch to "Condenser".

   b. Measuring

      (1) The method of measuring is the same as for the insulating resistance measurement.
      (2) Attach the test wire lead to the condenser. (Fig. 5-95)
      (3) The meter pointer swings to the right. Read the pointer indication and multiply that value by μF. That is the capacity (microfarads). Generally, if the value is from 0.21μF to 0.26μF, it is satisfactory; if less than 0.21μF, the capacity is insufficient or the condenser defective.

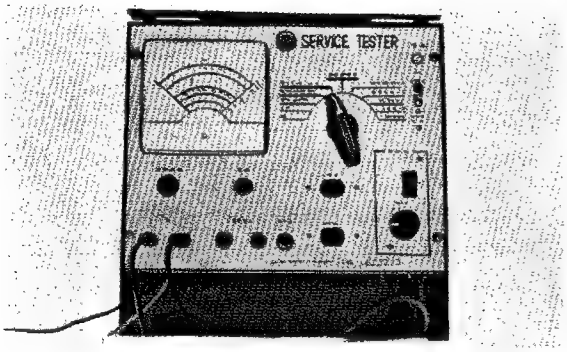


Fig. 5-95. Condenser capacity measuring (Scale measuring by standard)

5. DC Voltage (Power source not required)

   a. Set the switch to "DC Voltage".

   b. Attach terminal X wire lead to the item being measured and read the pointer swing on the blue scale. (It can be measured up to DC 30V). (Fig. 5-95)

   c. Attach red test wire lead to the positive (+) side of the item being measured, and black wire to the negative (—) side of the item.

6. DC Current (Power source not required)
Measuring charging and discharging of the battery, this method is used when detecting generator, selenium rectifier, wiring troubles, etc.

a. Preparation

(1) Connect the wire lead for current measurement to the tester DC current terminal.

(2) Separate the positive (+) side of the battery from the wire harness and connect the battery to tester black lead wire. Connect the separated wire harness (selenium, combination switch side) to the red tester lead wire. (Fig. 5-96)

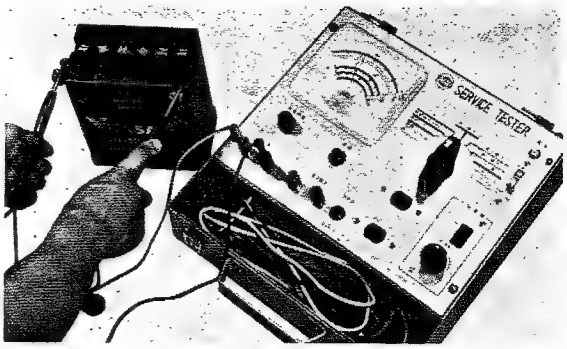


Fig. 5-96. D.C. voltage measurement

b. Measuring

Turning the tester switch to "DC Current (+)", when the engine is started, if the meter swings to the positive direction, it indicates the charging value, and if the swing is to the negative side, it indicates discharging. If the meter needle scales out to the left side, turn the selector switch to the position "DC Current (−)". Then, the discharging current value can be measured. (Fig. 5-97)

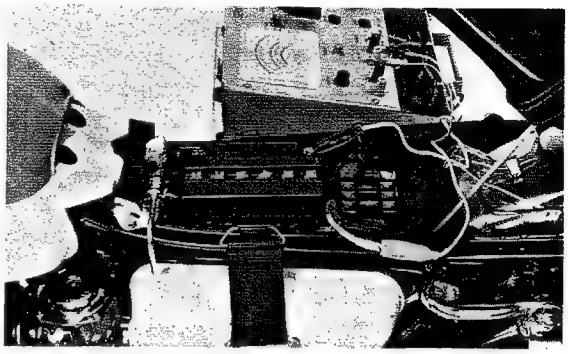


Fig. 5-97. D.C. current measurement

NOTE :

- When the speed is around 1500 rpm, and the switch is turned to (+) side, if the meter indicates about "O", and if the charging value rises accordingly with the speed increase, it can be judged that the generator, rectifier, etc., are operating correctly.
- For generator characteristics refer to the Section 5-4. A.C. general characteristics.
- If the attached shunt is used, the measurement can be performed up to 60A. Refer to the Section 11 External Shunt.

7. Tachometer (Power source not required)

This tachometer is for measurement of engine speed which is required in inspecting electric parts operations, such as the ignition timing, charging current, etc., and not for measurement of the maximum speed; thus, speed can be measured up to 6000 rpm as the maximum.

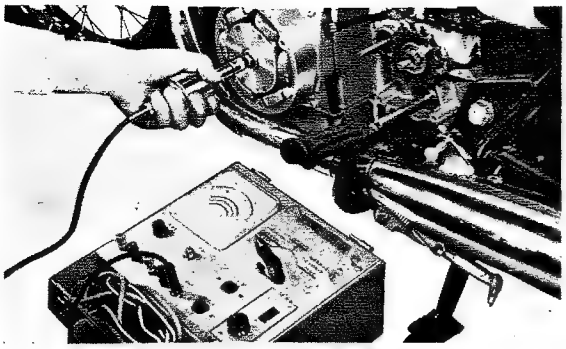


Fig. 5-98. Engine revolution measurement

a. Preparation

(1) Set the tachometer switch to "ON". (The selector which can be positioned anywhere.)

(2) Connect the tachometer plug to the jack marked "tachometer" on the tester, and read the "6000 rpm" side of the meter green scale. (Fig. 5-98)

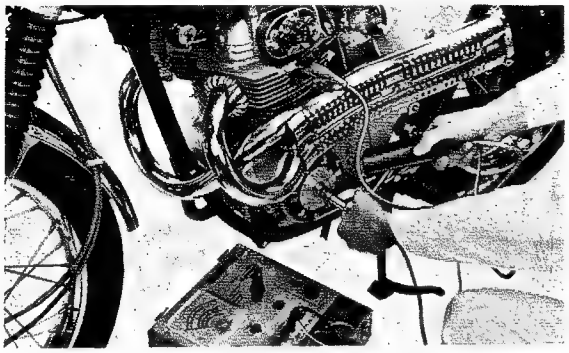


Fig. 5-99. Timing measurement

8. Timing light (Power source required)

This light is used together with the tachometer to check the ignition timing and advancing condition. (Fig. 5-99)

a. Preparation

(1) Connect the power source battery, and set the switch on "Timing".

(2) Connect the timing light red and white parallel cord plug to the socket marked "Timing" on the tester.

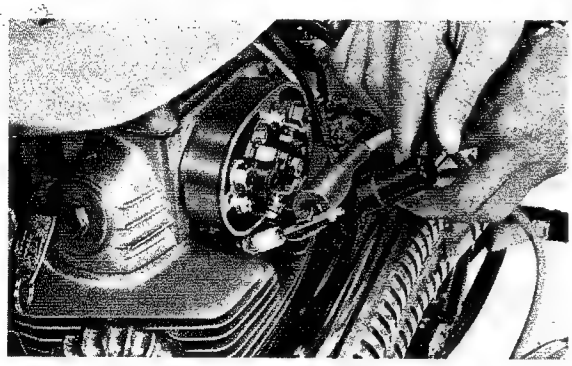


Fig. 5-100. Connection of the timing light cord

(3) The timing light high voltage cord is connected to the alligator clip on the high voltage cord end by using attached metal fixture (a hex. rod). (Fig. 5-100)

(4) Remove generator cover, and point cover individually beforehand.

b. Measuring

(1) Setting the tester switch to "Timing", start the engine. The timing light will flash.

(2) Apply the timing light illumination to the generator rotor. The ignition timing mark on the rotor can be seen. Observing the difference between the marks on the generator stator and rotor, loosen the contact breaker installing screw, and adjust the ignition timing.

NOTE :

Since the advancer beginning speed is 1500~2100 rpm, engine speed should be adjusted below 1500 rpm with the tachometer.

(3) Raise the engine speed, while reading the speed on the tachometer, and note the spark advance condition.

9. Coil test No. 1 (Power source required)

This test is performed only for ignition coil efficiency. When starting is defective, perform this test together with that of electrical parts around the system such as spark plugs, points, condenser, etc.

a. Preparation

(1) Connect the power source battery (12V), and ground.

(2) Connect the white cord with the connecting plug to (—) terminal and the red to the (+) terminal.

(3) Connect the red high voltage cord, which comes from the tester socket to the high voltage cord of the coil.

b. Measuring

(1) Perform coil test on the switch.
(2) Observing the sparking among the three electrodes, and turning the knob, measure the spark gap. (Fig. 5–101)

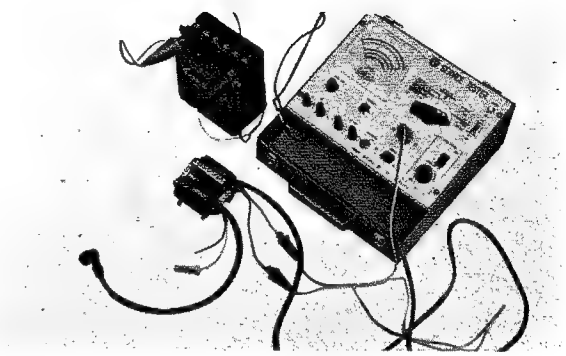


Fig. 5–101. Coil test connection

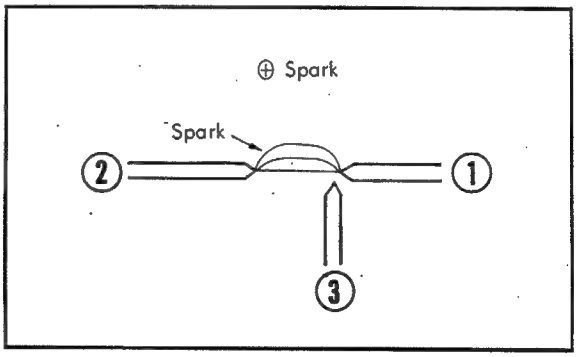
NOTE :

The condition in which spark is pulled to the 3rd electrode is normal, and when the spark between the 1st and 2nd electrodes is separated from the 3rd electrode, connect the primary side positive (+) and negative (—) terminals reversely.

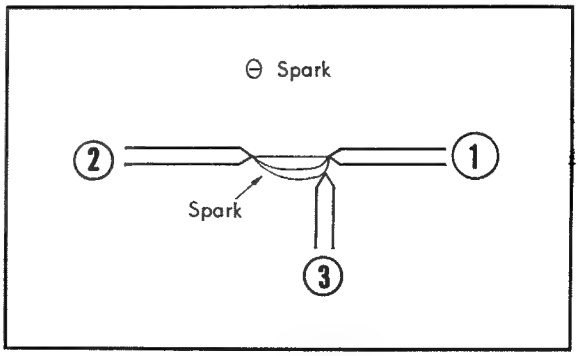
a. When compared with the positive sparking, the spark gap of the negative sparking becomes less. This should be noted. (Fig. 5–102, 103)

b. Test should be performed to both left and right high voltage cords individually, and when testing, the high voltage cord which is not being tested should be connected to the white cord of the test lead cable, and further connected to the battery terminal.

c. When the coil is being tested on the motorcycle, the black ground cable which is come out together with the power source cord must be grounded to a part of the motorcycle body. If not, a shock may be expected.



① 1st electrode ② 2nd electrode ③ 3rd electrode
Fig. 5–102. Coil test (negative sparking)



① 1st electrode ② 2nd electrode ③ 3rd electrode
Fig. 5–103. Coil test (positive sparking)

10. Coil Test No. 2 (Power source not required)

This measurement is connected strictly by the three-electrode tester and has no relation to the switch, power source, etc.

a. Preparation

(1) Utilizing 4 mm hex. rod bolt, connect the tester three electrode gap high voltage cord to the inside of the plug cap.

(2) Ground the black power source cable to the engine or motorcycle body.

b. Measuring

(1) Turn the engine switch on, let it spark among the three electrodes by kicking the kick starter or by the starter button, and measure the spark gap.

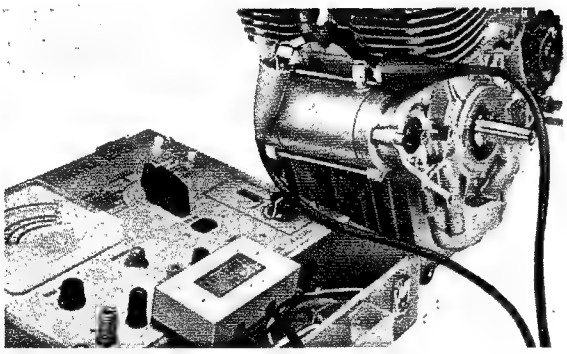


Fig. 5-104. Starting motor current measurement

11. External shunt

Using this shunt, starting current can be measured (up to 60A).

(1) Tighten the shunt on the tester DC current.

(2) Removing primary starter cable, connect the red shunt cord to the starter terminal, and connect the black shunt cord to the cable removed.

(3) Turning switch to the DC current (+), push the starter button, and note the starter current. (Fig. 5-104)

NOTE :

- When the shunt is installed on the tester, tighten firmly. When the meter deflection is reverse, the connection must also be reverse. In this case, the measurement should be performance by changing the switch to negative (—).
- Since the starter cranking current is more than 60A, the starter chain should be disconnected when marking this test. In this manner, the starter unloaded current is measured. (Refer to the Section 5-5B for starter characteristics)

5.10 BATTERY TROUBLE SHOOTING AND CORRECTIVE ACTION

Trouble	Probable cause	Correct action
A. Sulfation The electrode plates are covered with white layer or in spots.	1. Charging rate is too small or else excessively large. 2. The specific gravity or the mixture of the electrolyte is improper. 3. Battery left in a discharged condition for a long period. (Left with the switch turned on). 4. Exposed to excessive vibration due to improper insulation. 5. Motorcycle stored during cold season with battery connected.	1. When motorcycle is in storage, the battery should be recharged once a month even though the motorcycle is not used. 2. Check the clectrolyte periodically and always maintain the proper level. 3. In a lightly discharged condition, performing recharging and discharging several times by starting the engine may be sufficient.
B. Self discharge Battery discharges in addition to that caused by the connected load load.	1. Dirty contact areas and case. 2. Contaminated electrolyte or electrolyte excessively concentrated.	1. Always maintain the exterior clean. 2. Handle the replenishing electrolyte with care and use clean container.
C. Large discharge rate Specific gravity gradually lowers and around 1.100, S.G the winker and horn no longer function.	1. The fuse and the wiring is satisfactory, loads such as winker and horn does not function. In this condition the motorcycle will operate but with prolong use, both ⊕ and ⊖ plates will react with the sulfuric acid and form lead sulfide peposits, (sulfation) making it impossible to recharge.	1. When the specific gravity falls below 1,200 (20°C : 68°F), the battery should be recharged immediately. 2. When the battery frequently becomes discharged while operating at normal speed, check the generator for proper output. 3. If the battery discharges under normal charge output, it is an indication of overloading, remove gome of the excess load.
D. High charging rate The electrolyte level drops rapidly but the charge is always maintained at 100% and the condition appears satisfactory. A condition which is overlooked. (Specific gravity over 1.260)	1. The deposit will heavily accumulate at the bottom and will cause internal shorting and damage the battery.	1. Check to assure proper charging rate. 2. When overcharge condition exist with the proper charging rate, place on appropriate resistor in the charging circuit.
E. Specific gravity drops Electrolyte evaporates	1. Shorted 2. Insufficient charging 3. Distilled water overfilled 4. Contaminated electrolyte	1. Perform specific gravity measurement. 2. If the addition of distilled water causes a drop in specific gravity, add sulfuric acid and adjust to proper value.

MEMO

6. INSPECTION AND ADJUSTMENT

6.1 PREVENTIVE MAINTENANCE

Preventive maintenance is periodical maintenance combining checking, repairing and adjusting various parts and systems for the vehicle, and sometimes the term "preventive maintenance" is also used for maintenance of vehicle components to maintain efficiency.

A. Engine Tune-up

Engine tune-up is a method to recover the normal engine condition. This is corrective action and different from inspection. The engine condition is determined by the following, and by checking and taking necessary action, the recovery can be accomplished.

Compression system
Ignition system
Power system
Fuel system

As long as these four major systems are satisfactory, the engine should be in good condition. In the following section, measurements and corrective action to be taken are explained in detail.

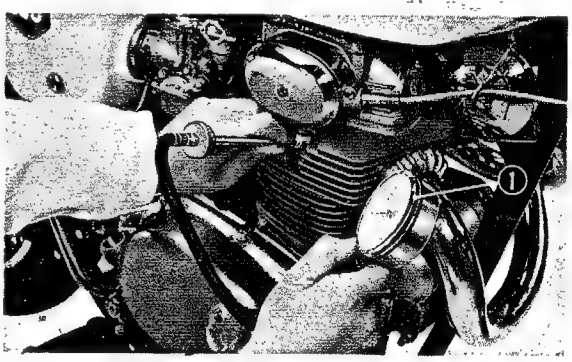
1. Measuring compression

If the cpmpression is insufficient, the engine loses power ; engine rotation decreases and engine may stall at low speed.

a. Remove the spark plug.

b. Fit the head of compression gauge on the plug hole. Hold if firmly so that compression is not lost. (Fig. 6–1)

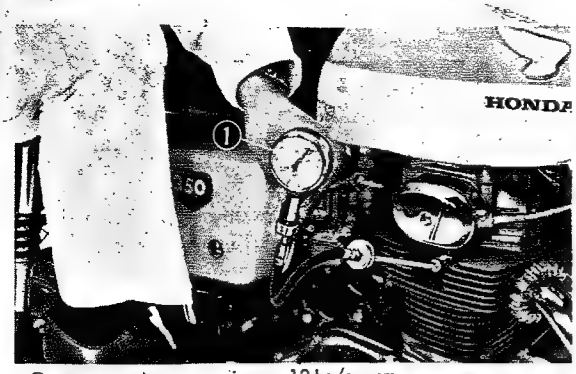
c. With the throttle fully open and carburetor choked, kick the kick stater pedal repeatedly, quickly and powerfully, and read the maximum value on the gauge.



① Compression gauge
Fig. 6–1. Compression measurement

NOTE :

- Make certain to open the throttle and choke fully, otherwise, the value on the compression gauge will be small.
- The compression value will rise gradually as the kick is repeated continue kicking until the maximum value becomes stable.
- To measure the specified compression, measurement should be performed while the engine is warm.



① The rated compression: 12 kg/sq•cm
Fig. 6-2. Rated compression

d. The rated compression is 12 kg/sq-cm (170 psi). (Fig. 6-2)

e. If the compression measures over 12 kg/sq-cm (170 psi), the combustion chamber wall and/or piston head probably have carbon deposit. Remove the cylinder head and cylinder, and remove the deposit.

f. When the compression is below 10.5 kg/sq-cm (150 psi), there must be blow-by at valve, piston ring head gasket and/or cylinder gasket. In this case, adjust the valve clearance, inspect the piston ring, gaskets, and other related parts by disassembling the engine.

2. Valve-tappet clearance adjustment

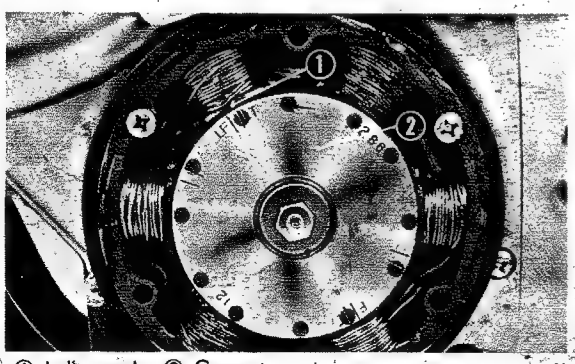
The valve-tappet clearance greatly affects the valve timing, and when the valves do not close perfectly due to shortness of tappet clearance, no compression may be observed. Conversely, when the valve-tappet clearance is excessive, the tappet striking noise becomes larger, which makes the engine noisy. Thus the valve-tappet clearance has a big influence on engine power, idling, and noise.

a. Dismount tappet hole caps.

b. Dismount the contact breaker point cover.

c. Dismount the generator cover.

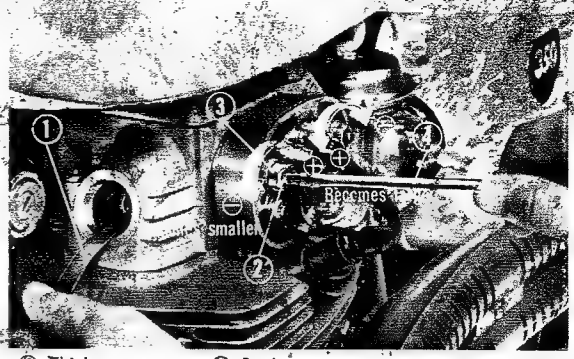
d. Place the left piston at top dead center. Align the "LT" mark on the generator rotor and the index mark on the stater. In this position, the left cylinder piston may either be on the compression or the exhaust stroke. The adjustment must be made when the piston is at the top of the compression stroke. At this state, both the inlet and exhaust ports are closed. This condition can be inspected by shifting the rocker arms with fingers through the tappet adjusting holes and, if the rocker arms are free, it is an indication that the valves are at closed position and that the piston is at the end of compression stroke. If the rocker arms are tight the valves are open, so rotate the generator rotor 360° and realign the "LT" mark to the timing mark. (Fig. 6-3)



① Index mark ② Generator rotor
Fig. 6-3. Aligning the "LT" mark

e. Adjust the left-hand side valve tappet clearance. The valve tappet clearance is measured between the end of valve stem and valve rocker arm. For adjustment, loosen the rocker arm lock nut, turn the rocker arm pin with a screwdriver, as shown in Fig. 6–4. The adjustment is performed within a range of 180°. (Fig. 6–4) The rated valve clearance should be as follows.

Valve Clearance	Standard Value
Inlet	0.05 mm (0.002 in)
Exhaust	0.10 mm (0.004 in)



① Thickness gauge ② Rocker arm pin
③ Rocker arm lock nut ④ Screw driver
Fig. 6–4. Adjusting tappet clearance

NOTE :

- When checking the inlet valve clearance, insert the 0.05 mm (0.002 in) thickness gauge, which is included in the tool kit, between the valve rocker arm and the end of the valve stem.
  The check the exhaust valve, insert two 0.05 mm (0.002 in) thickness gauges between the valve rocker arm and the end of the valve stem since the valve clearance for the exhaust valve is 0.10 mm (0.004 in).
- The valve-tappet clearance should be adjusted when the engine is cold. Upon completion of the clearance adjustment, tighten the rocker arm lock nut carefully so that the rocker arm pin does not rotate. Recheck the clearance after tightening the nut.

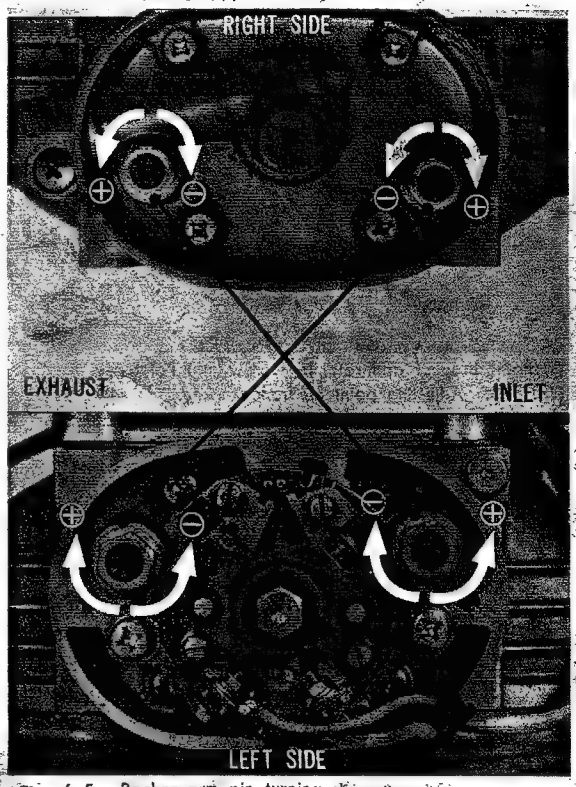
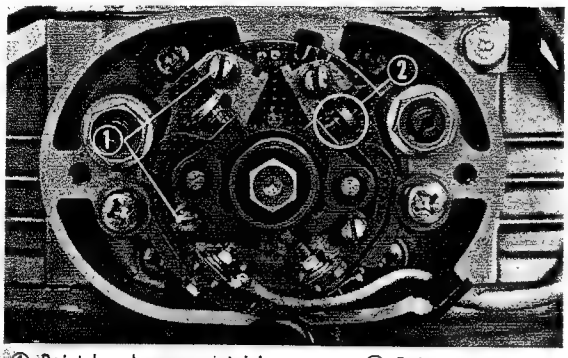


Fig. 6–5. Rocker arm pin turning direction

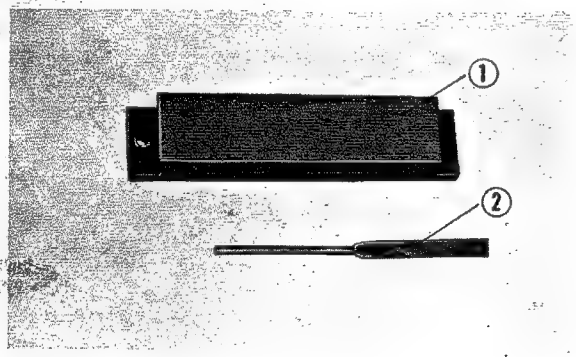
Left cylinder (Fig. 6–5)
To decrease the valve clearance, turn the rocker arm pin in the **counterclockwise** direction for the exhaust valve, and turn in the **clockwise** direction for the inlet valve. Turning the rocker arm pins in the opposite direction to the above will increase the valve clearance.

Right cylinder (Fig. 6–5)
To decrease the valve clearance, turn the rocker arm in the **clockwise** direction for the exhaust valve, and turn in the **counterclockwise** direction for the inlet valve. Turning the rocker arm pins in the opposite direction to the above will increase the valve clearance.

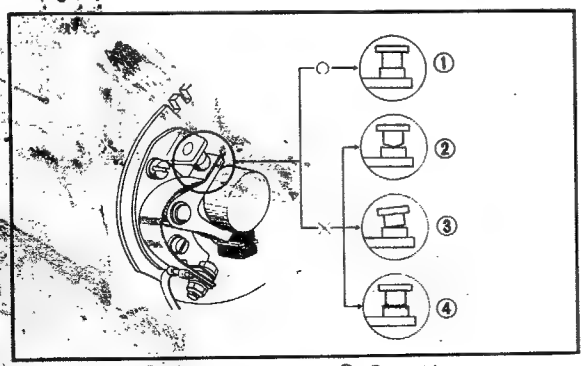
f. Place the right piston at compression top dead center. By turning the crankshaft to the left 180°, the intake and exhaust valve tappet clearance adjustment is performed in the same manner as for the left hand side.



① Point breaker arm retaining screw ② Point gap
Fig. 6-6. Adjusting point clearance



① Oil stone ② Point file
Fig. 6-7. Point surface correction



① Correct ② Contact is worn ③ One side contact
④ Contamination of the contact
Fig. 6-8. Point contacting surface center portion contacting condition

3. Ignition timing adjustment

Although the compression is sufficient and the valve opening and closing are functioning properly, if the ignition timing is incorrect, the engine cannot accomplish its maximum performance. Moreover, backfire and/or overheating may occur which affect performance and serviceable life of the engine.

Adjustment of the contact breaker point gap.

a. Remove the point cover.

b. Remove the generator cover.

c. Align the top of cam lobe of the point cam with the slipper unit of the contact breaker arm, by turning the generator rotor counterclockwise.

NOTE :

When aligning either right or left, remember that one cam lobe corresponds to two points.

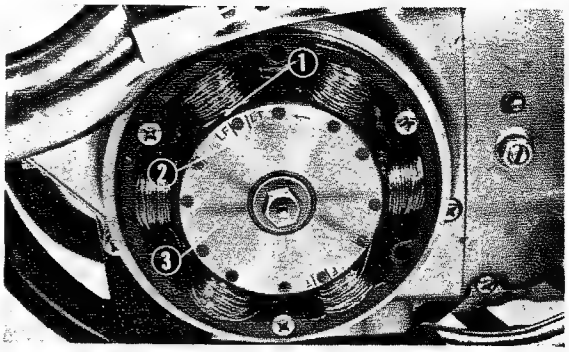
d. The point gap adjustmennt is performed with the breaker arm retaining screw loosened with a screwdriver. (Fig. 6-6)

e. The point gap should be 0.3 to 0.4 mm (0.012 to 0.016 in). Both the right and left should be adjust to the same value.

NOTE :

- When the generator cover is removed, a little oil may drop off.
- The point gap should be adjusted for both right and left.
- When the breaker arm retaining screw is tightened, the point gap may vary ; therefore, the clearance should be rechecked after tightening the screw.
- If the point surface is rough or burned, the point should be removed and polished with an oilstone. Afterwards, check the contacting condition if the whole surfaces contact. (Fig. 6-7, 8)
- Upon completion of the point polishing and adjustment, clean off oil with trichloethylene

f. After completing the breaker point gap adjustment, the adjustment of the ignition timing should be made. The correct ignition timing for the left cylinder is for the ignition to take place when the "LF" mark on the generator rotor has just passed the timing index mark on the generator stator, in other words, the breaker points should be about to open. The ignition timing of the right cylinder is at the point where the "F" mark on the rotor passes the index timing mark on the generator stator. (Fig. 6–9)



① Stator index mark ② "LF" mark ③ Generator rotor
Fig. 6–9. Aligning the "LF" mark

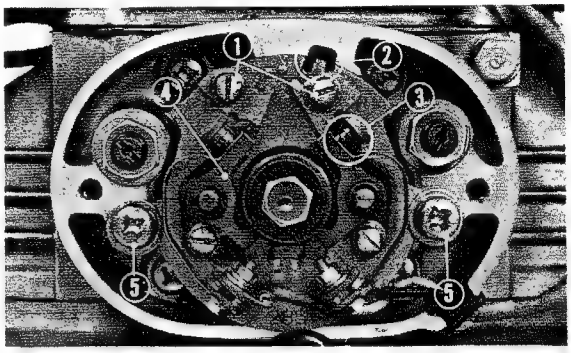
NOTE :

When adjusting the ignition timing, remember that the contact points do not begin to open unless a piston comes to the compression top dead center.

g. For the ignition timing adjustment, align the mark "LF" with the index mark on stator by turning the generator rotor, adjust the breaker base plate so that the contact points begin to open, with the retaining screw loosened, thus, the left side (the one with yellow lead) is adjusted.

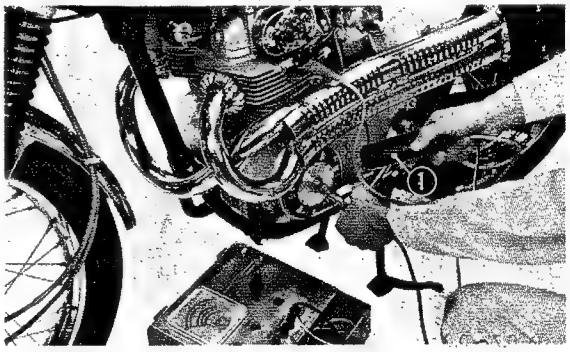
Turn the breaker base plate clockwise to advance the ignition timing, and counter-clockwise to retard.

Following this adjustment, turn the rotor 180° and align the mark "F" with the index mark to make adjustment of the right side (the one with blue lead). (Fig. 6–10)



① Contact breaker locking screw
② Portion to be adjusted by a screw driver
③ Contact breaker ④ Contact breaker arm
⑤ Contact base plate locking screw
Fig. 6–10. Ignition timing adjustment

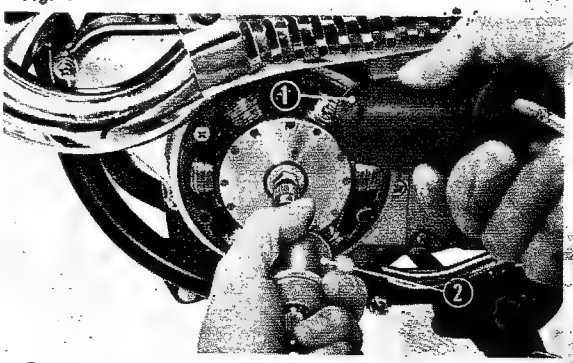
h. Upon completion of the point gap and the ignition timing adjustment, check the operating condition of the spark advancer with a timing light. (Fig. 6–11)



① Timing light
Fig. 6–11. Start of spark advancing

NOTE :

The ignition timing and timing at the end of the spark advancer can be measured with a timing light. The ignition timing at the end of spark advance is indicated by two marks 30° before marks "F" : and "LF". The stator index mark should be between these two marks. (Fig. 6–12)

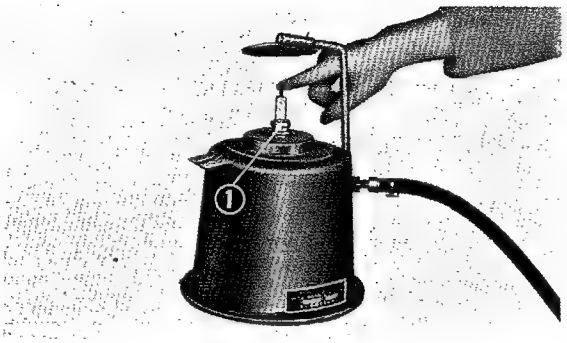


① Timing light ② Tachometer
Fig. 6–12. End of spark advancing

4. Sark plugs

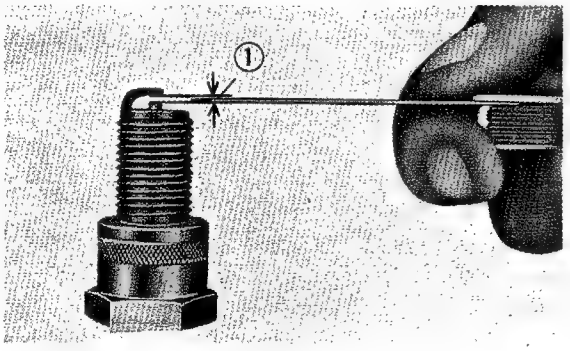
The engine condition is greatly influenced by the condition of the spark plugs. If the spark plugs are contaminated or broken, or the electrodes are worn, a spark is not produced efficiently, and therefore, good engine operation cannot be expected. For this reason, cleaning and adjustment of spark gap should be performed periodically. When carbon or other matter exists on the electrodes, or when the electrodes are wet, the high voltage passes through the mediums, and effective spark cannot be produced.

a. It is best to use a spark plug cleaner for cleaning, however, when cleaner is not available, scrap with a piece of wire or needle, and wash with gasoline and wipe off with a dry rag. (Fig. 6–13)



① Spark plug
Fig. 6–13. Spark plug cleaning

b. After cleaning, adjust the spark gap. Adjust with a thickness gauge so that the gap is between 0.7 and 0.8 mm. (Fig. 6–14)



① 0.7~0.8 mm (0.028~0.32 in)
Fig. 6–14. Spark gap measuring

NOTE :

- Under no circumstances should a torch be used to remove the deposit.
- When reinstalling spark plug, wipe off oil and dust around the spark plug hole on the cylinder head.
- When installing spark plug, first screw in by hand as for as it goes, and then tighten firmly with spark plug wrench.
- Spark plugs should be periodically inspected. If a spark plug is used for a long period of time, the electrode gradually burns and the sparking efficiency lowers.

c. The spark plug efficiency can be detected with a spark plug tester. Inspect the sparking condition by changing the tester internal pressure, with the rated voltage applied.

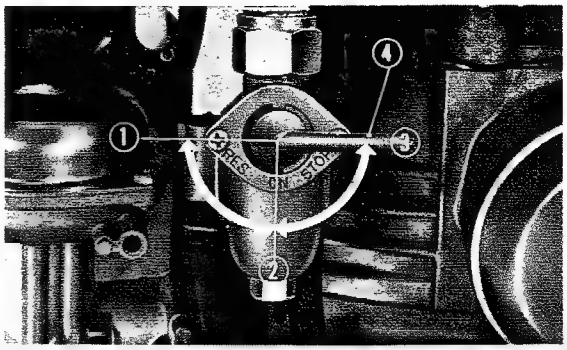
5. Fuel system

When the fuel system is clogged, enough fuel is not fed to the carburetor ; and when engine speed is increased, the engine does not operate smoothly, and sometimes stall at high speed.

a. Check the fuel level.

b. Remove the feed tube from the carburetor and check if fuel flows out when the fuel cock lever is tuned to "ON" or "RES" position. (Fig. 6-15)

c. If no fuel flow is observed, disassemble and clean the fuel valve. It may be necessary to clean the fuel tank.



① "RES" position ② "ON" position
③ "STOP" position. ④ Fuel cock lever
Fig. 6-15. The cock lever "ON" or "RES" position

NOTE :

- Note that poor fuel flow can also be caused by the dirty tank, clogged filler cap or tubes. (Fig. 6-16)
- The position "RES" is used after the main tank becomes empty. For scrambler model, reserve tank has the capacity of 2.2 liters (0.581 U.S. gal) which would be good enough to cover the distance of 50 miles ; for sport model, capacity is 3 liters (0.792 U.S. gal), good for 60 miles of run.

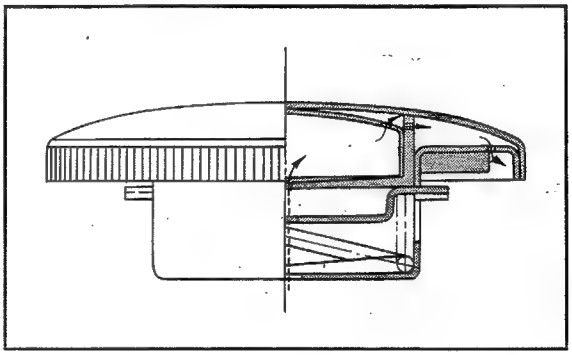
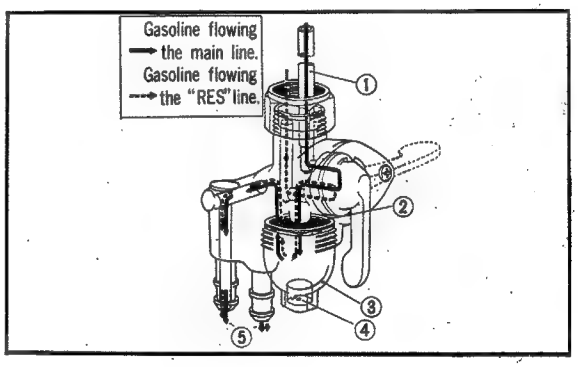


Fig. 6-16. Filler cap cross-section showing breather path

d. Cleaning gasoline strainer

If there is dust or water in the fuel valve, gasoline will not flow well, and will cause poor engine performance due to low carburetor efficiency. Inspect the valve, strainer, and filter screen periodically. (Fig. 6-17)



① Main line ② Screen ③ Strainer cup
④ Dust, water, etc, ⑤ To the carburetor
Fig. 6-17. Gasoline flow through the fuel cock

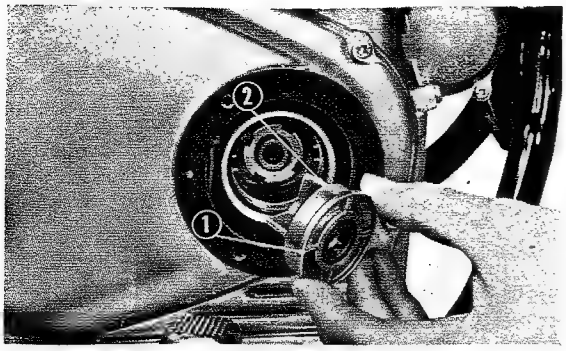
6 Cleaning oil filter

If the oil filter is clogged, all the moving portions will be damaged ; the engine performance is lowered and service life of the engine is shortened.

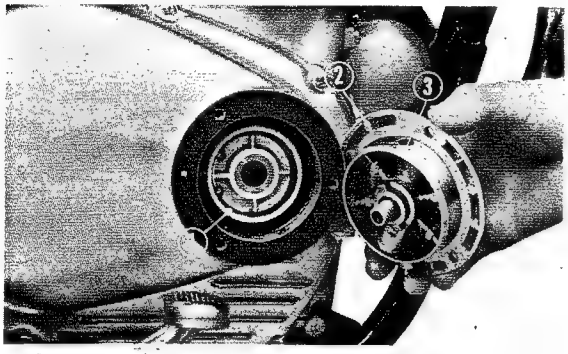
a. Remove the oil filter cover.

b. Remove the internal circlip and take off the rotor cap. The rotor cap may be removed easily by unscrewing a 6 mm bolt.

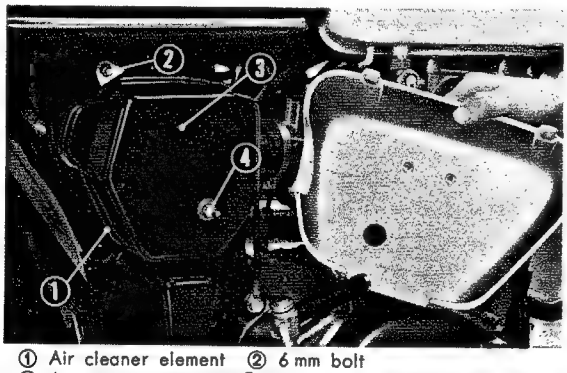
c. Wash the rotor cap and interior of the rotor the thoroughly.



① Rotor cap ② Vane
Fig. 6–18. Rotor cap installation



① Rotor cap ② Oil filter cover ③ Oil filter opening
Fig. 6–19. Oil filter cover installation



① Air cleaner element ② 6 mm bolt
③ Air cleaner case ④ Special 6 mm nut
Fig. 6–20. Air cleaner case removing

NOTE :

- A little oil will come out when the oil filter cover is removed.
- When reinstalling the rotor cap, the rotor cap vane should be matched to the groove on the inside wall of the rotor. (Fig. 6–18)
- Make sure that the spring loaded oil pump plunger is cleaned and free in the oil filter cover.
- When reinstalling the oil filter cover, make sure to position it properly. (Fig. 6–19)

7. Air cleaner element Cleaning

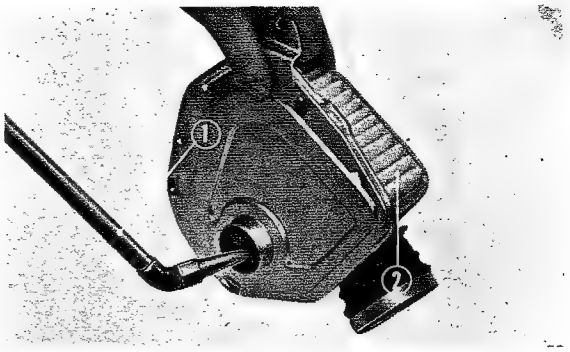
When the air cleaner element is clogged with dirt, air is not taken in freely, therefore, sufficient power cannot be obtained out of the engine and acceleration becomes poor. Clean the air cleaner element periodically.

a. Remove air cleaner cover, and loosen air cleaner case setting nut.

b. Remove air cleaner connecting tube setting screws.

c. Loosen air cleaner element mounting 6 mm bolts, and remove the air cleaner element together with the air cleaner case. (Fig. 6–20)

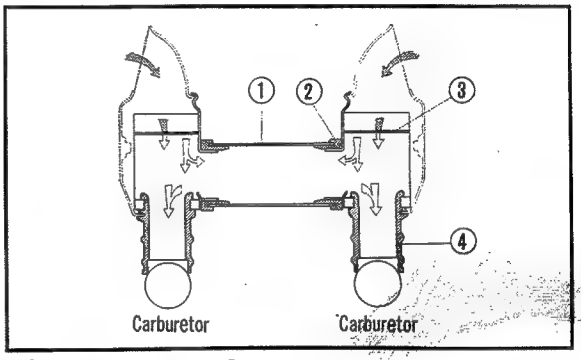
d. Tap the element lightly. Use compressed air for better cleaning effect (blow the dust out from inside of the elements). (Fig. 6–21)



① Air nozzle ② Air cleaner element
Fig. 6–21. Air cleaner cleaning

NOTE :

- Do not drop oil on the element as it interrupts air filteration.
- When mounting, join the right and left air cleaners with the air cleaner connecting pipe and joint tube. If mounted incorrectly, dirty air is taken in, which causes early wear of cylinder wall and piston rings. (Fig. 6–22)
- Insure that air is not taken in from anywhere beside air cleaner.

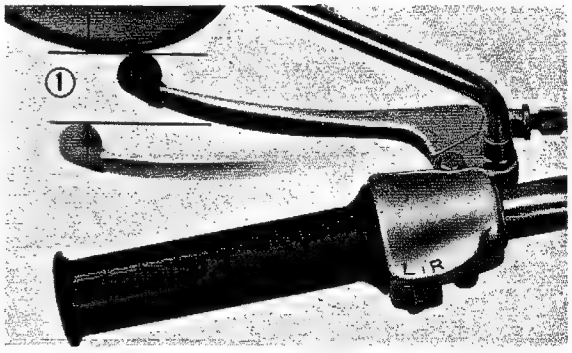


① Air cleaner pipe ② Air cleaner joint tube
③ Filter paper ④ Connecting tube
Fig. 6–22. Sectional view of air flow

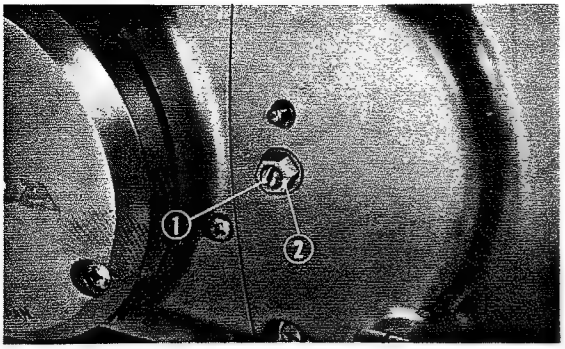
8. Clutch adjustment

If the clutch does not completely disengage, the engine will stall when shifting into gear or else the motorcycle will have the tendency to creep even with the clutch lever disengaged. However, in the other case, if the clutch does not fully engage, the clutch will slip and the motorcycle will not accelerate in response to the acceleration of the engine. In order for the full engine output to be delivered to the rear wheel, it is necessary to have the clutch properly adjusted.

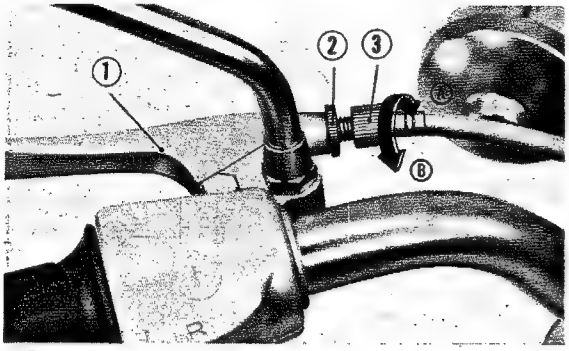
The clutch lever play is the stroke of the lever from the normal lever position to the position where the clutch begins to disengage. The proper clutch lever play is between 10 and 25 mm (0.4 – 1.0 in) at the tip (Fig. 6–23). If the clutch does not disengage properly even if the clutch lever play is properly adjusted, further adjustment should be made with the clutch adjuster on the left crankcase rear cover.



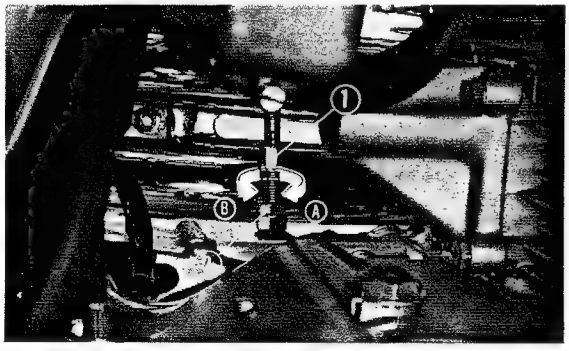
① 10~25 mm (0.4~1.0 in)
Fig. 6–23. Clutch lever play



① Adjuster ② Clutch locking nut
Fig. 6-24. Clutch adjustment



① Clutch lever ② Lock nut ③ Adjusting bolt
Ⓐ Increasing the lever play Ⓑ Decreasing the lever play
Fig. 6-25. Adjusting clutch cable A



① Adjusting bolt ② Lock nut
Fig. 6-26. Adjusting clutch cable B

a. First screw in the clutch lever adjusting bolt to make the lever free.

b. Loosen the locking nut of the adjuster and turn the adjuster counterclockwise until is meets noticeable resistance. (To eliminate the clutch push-rod play.)

From that position, screw out the adjuster (clockwise) by 1/4 of a turn for proper positioning of the adjuster, then turn the locking nut to lock it. (Fig. 6-24)

c. Readjust the clutch lever play by screwing out the clutch lever adjusting bolt and adjusting nut. (Fig. 6-25, 26)

NOTE :

The clutch lever should be made free first by screwing the adjusting bolt in. Otherwise, the balls in the ball lifter may move out of the guide occasionally when turning the adjuster on the left crankcase rear cover.

d. Insure that there is no slipping and that the clutch disengages completely.

(1) Does the engine start easily when the kicking pedal is kicked? (With the clutch disengaged)

(2) When the engine is started, does the clutch grab? When shifting into low geor with the clutch disengaged, does the motorcycle start moving or does the engine stall?

(3) When the clutch lever is released gradually and the engine is accelerated, does the motorcycle start moving smoothly?

9. Carburetor cleaning and adjustment

If the carburetor is contaminated or improperly adjusted, the engine efficiency is noticeably lowered. For example, if the fuel-air mixture is too lean, the engine overheats, and if it is too rich, engine operation becomes unstable. If fuel overflows, fire may be caused. For these reasons, the carburetor must be inspected, and adjusted periodically. (Dismantled and cleaned if necessary)

a. Remove both left and right air cleaner covers.

b. Loosen the throttle cable adjusting bolt and nut, and remove the throttle cable from the carburetor.

c. Loosen the carburetor holding straps, and remove the carburetors.

d. Disassemble and clean the carburetors with gasoline.

e. Use compressed air to clean the individual nozzles. After cleaning, reassemble, reinstall, and adjust.

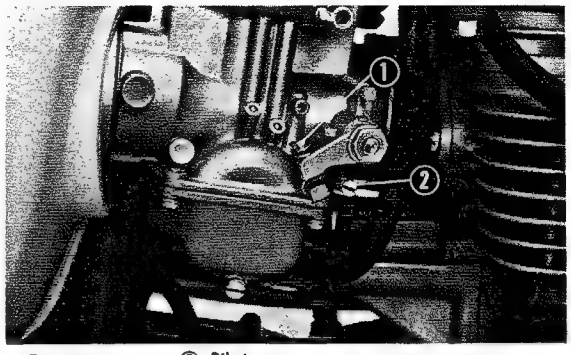
f. Idling adjustment

(1) Adjust the stop screws of both right and left carburetors so that the exhaust muffler back pressure is the same for both. If the engine revolution does not lower when the stop screw is screwed out, loosen the lock nut and screw in the cable adjuster by about one turn. The engine rpm at this state is between 1100 – 1200 rpm.

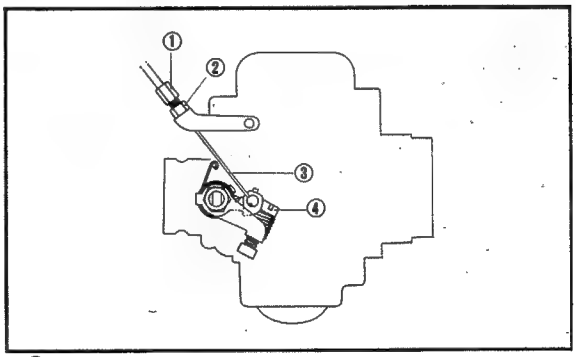
(2) Starting with either the right or left carburetor, manipulate the pilot screw and find the point of highest rpm; the same should be done with another carburetor. Turning the pilot screw IN will give a richer fuel-air mixture, and turning the screw OUT will give a leaner mixture. The pilot screw should be set at the position between 1 turn and 1¼ turn back-off from full close.

(3) After completing the adjustment in paragraph (2) above, recheck the exhaust muffler back pressure on both the right and left carburetors and, if necessary, readjust the stop screws as was done in paragraph (1).

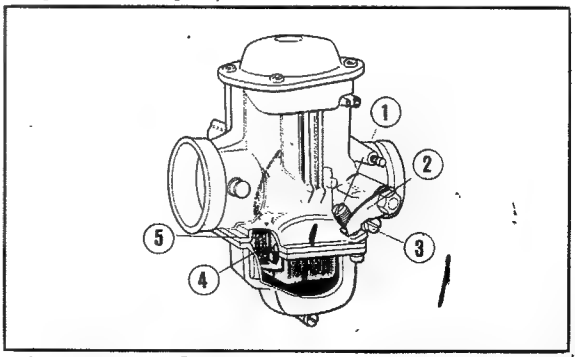
(4) Repeat the procedures from paragraph (1) through (3) several times so that the pilot screw is set to provide the specified rpm and that the same exhaust back pressure is obtained for both the right and left. (Fig. 6–27 through 28, 29)



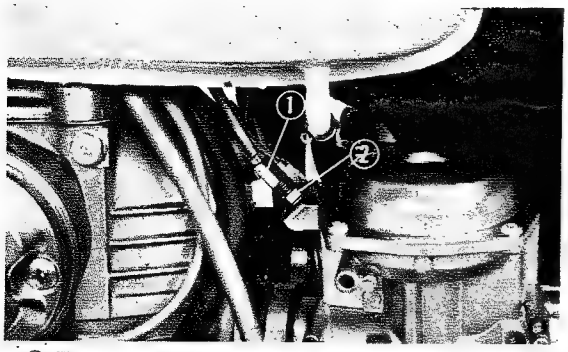
① Stop screw ② Pilot screw
Fig. 6–27. Idling adjuster



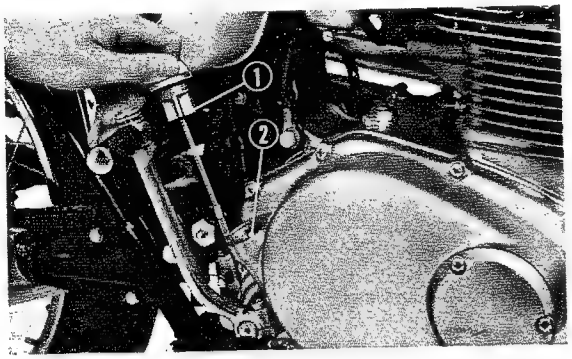
① Throttle cable adjuster ② Lock nut ③ Throttle cable ④ Stop screw
Fig. 6–28. Idling adjustment



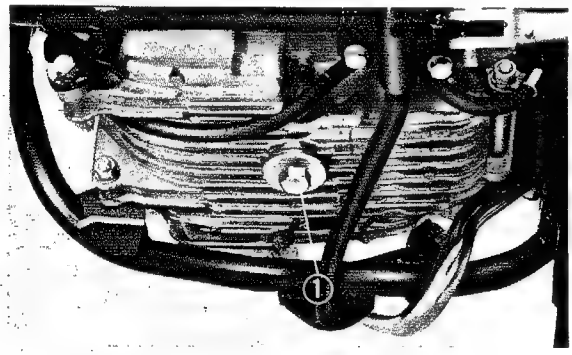
① Stop screw ② Throttle lever ③ Pilot screw ④ Valve seat ⑤ Valve
Fig. 6–29. Cross-section of carburetor



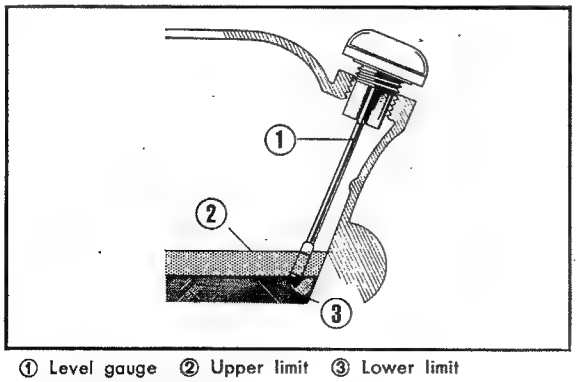
① Throttle cable adjust bolt ② Lock nut
Fig. 6-30. Throttle valve adjustment



① Oil filler cap ② Oil filler inlet
Fig. 6-31. Oil filter cap



① Drain plug
Fig. 6-32. Oil drain plug



① Level gauge ② Upper limit ③ Lower limit
Fig. 6-33. Level gauge

g. Throttle valve adjustment

Make the adjustment so that the operations of right and left throttle valves are aligned. This adjustment can be made by noticing the movement of throttle lever with a hand positioned under the carburetor or by observing the movement while the throttle grip is slowly moved. Assure that the throttle levers start moving at the same time. If adjustment is required, loosen the lock nut and perform the adjustment with the cable adjust bolt. (Fig. 6-30)

8. Lubrication

Rotating units require lubricant to reduce friction for minimizing wear and heat, and also for preventing seizure. Without proper lubrication, the serviceable life of the engine is shortened, and failure of the machine will occur.

1. Parts which do not require perioeical lubrication. There are some parts like steering ball, cone race, and throttle grip for which periodic lubrication is not required. Lubricate these parts only when disassembled or overhauled.
2. Engine oil change

   The engine oil should be changed after the first 300 miles of drive and every 2000 miles thereafter.

   a. Remove the oil filler cap and drain plug on the bottom of the crankcase and drain all the engine oil. Draining will be hastened if oil filler cap is removed. (Fig. 6-31, 32)

   b. After draining, retighten the drain plug and pour new oil into the engine through the oil filler opening.

   c. If the oil level is between lower and upper limits on the oil level gauge dipstick with the filler cap not threaded in but just inserted, it indicates that the oil level is correct. (Fig. 6-33)

NOTE :

- If the oil level becomes below the limit mark on the oil level gauge dipstick, add oil through the filler up to the upper limit mark to keep the engine in good condition.
- Do not overfilling the crankcase with oil, otherwise, the excessive oil flows out of the breather.

- When driving the motorcycle in unusually dusty condition, it is recommended that oil change be performed at more frequent intervals than what is specified in the maintenance schedule ; this will have a very beneficial effect on the performance and serviceable life of the engine.
- Always use only the oils classified for A.P.I. service M.S.– D.G. (and/or D.M.) or the use of all season SAE group 10W–30 oil is recommended.

3. Grease

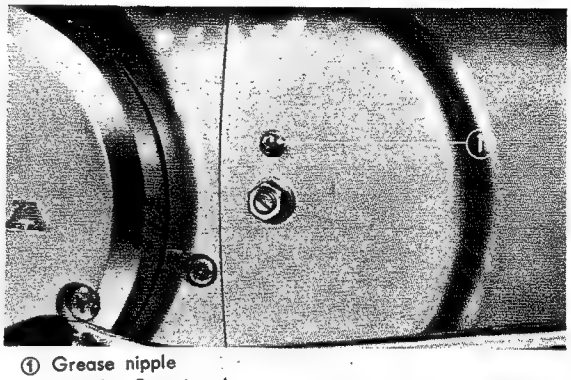
   a. Greasing of fittings

      Fittings are greased with a grease gun. Continue greasing until grease appears around the nipple. There are three greasing points as shown in the figure. (Fig. 6–34 through 35, 36)

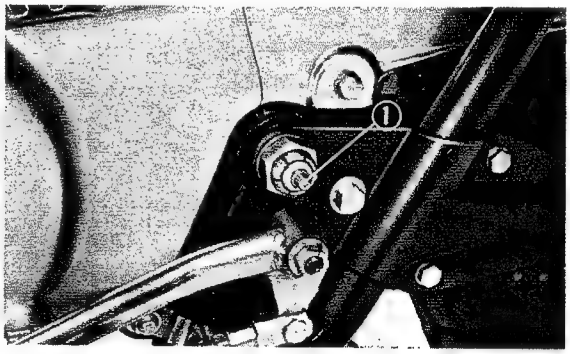
   b. Grease will prevent the wear of the friction components, assisting in extenting the serviceable life. It is recommended that the greasing be performed every 3000 miles of drive.

NOTE :

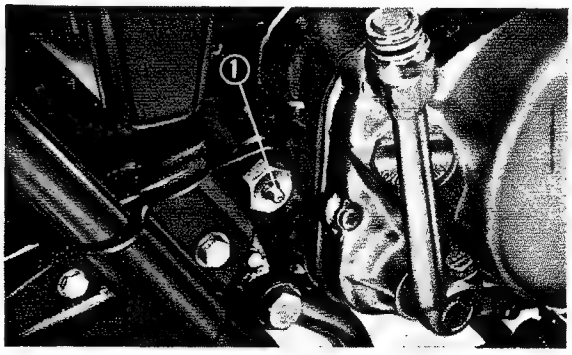
The proper grade of grease to be used is multi-purpose type NLGI No. 2.



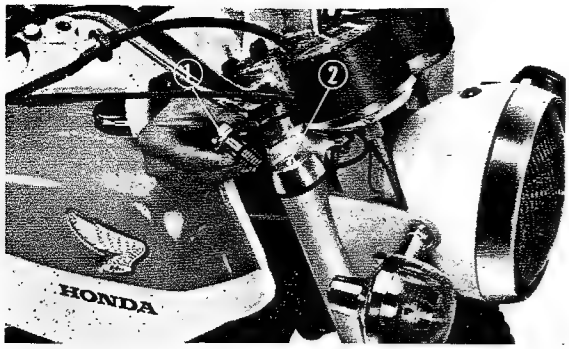
① Grease nipple
Fig. 6–34. Greasing A



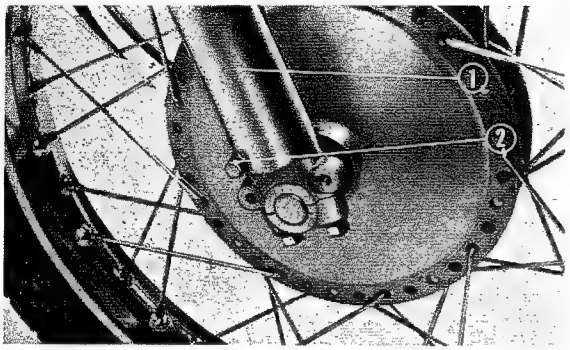
① Grease nipple
Fig. 6–35. Greasing B



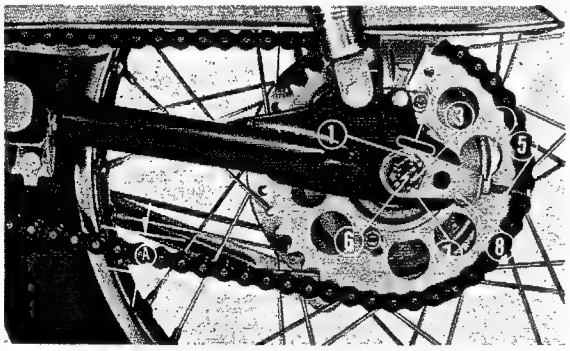
① Grease nipple
Fig. 6–36. Greasing C



① Front fork bolt ② Oil filler opening
Fig. 6-37. Front fork bolt



① Front fork bottom case ② Front fork drain plug
Fig. 6-38. Front fork drain plug removing



① Index mark ② Reference mark ③ Rear axle
④ Lock nut ⑤ Adjusting bolt ⑥ Cotter pin
⑦ Axle nut ⑧ Chain adjuster
Ⓐ 10~20 mm (0.4~0.8 in)
Fig. 6-39. Drive chain slackness and adjustment

4. Front fork oil change

To the telescopic type fork (front shock absorber), side pressure is applied to the front and rear directions during driving, in addition to the vertical vibration, and accordingly, the oil is contaminated by fine metal powder created by initial wear; thus, it is desirable to change the oil after the first 300 miles of drive, and 2000 miles after it. Following this second change, oil is changed every 5000 miles.

a. Remove the front fork bolt and drain plug, and drain the oil. Make certain to drain oil completely. (Fig. 6-37, 38)

b. Clean inside with oily solvent.

NOTE:

- Do not use gasoline for cleaning inside.
- Drain the solvent in the same manner as for the oil.

c. Tighten the drain plug, and pour 200 cc of corrosion resistant oil into each shock absorber unit.

C. Drive Chain Adjustment

If the drive chain is too loose, it causes chain knock when driving; and if too tight, the chain offers resistance and sufficient power is not transmitted to the rear wheel. The drive chain should be adjusted to the proper tension.

1. The maximum slackness when measured by moving the drive chain vertically is 10 to 20mm (0.4 to 0.8 in). If adjustment is necessary, remove the cotter pin from the left side of the rear wheel axle, and loosen the axle nut. (Fig. 6-39)

To adjust the chain tension, first loosen the lock nut on both the right and left chain adjuster and then turn the adjusting bolts clockwise to increase the tension. To decrease the tension, turn the adjusting bolts counterclockwise. Upon completion of the adjustment, the index mark on both the right and left chain adjuster should be at the same reference mark on the rear fork. Finally, tighten the axle nut and install the cotter pin to prevent the axle nut from becoming loose.

2. Perform the periodical cleaning and lubrication. If not sufficiently lubricated, the chain links may bind, and drive sprocket may also be affected.

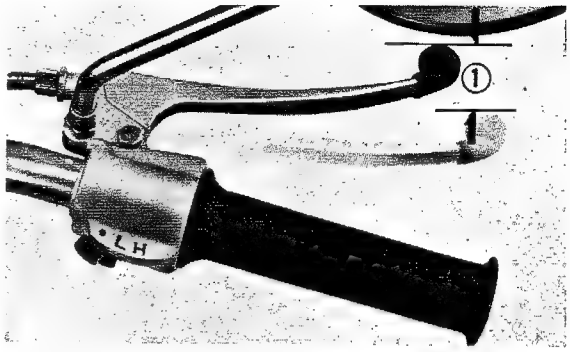
   Lubricate the drive chain with engine oil every 1000 miles.

D. Brake Adjustment

The driver's life depends muce on the brake, therefore, make it a habit to inspect the brake daily before use, in addition to the periodical inspections.

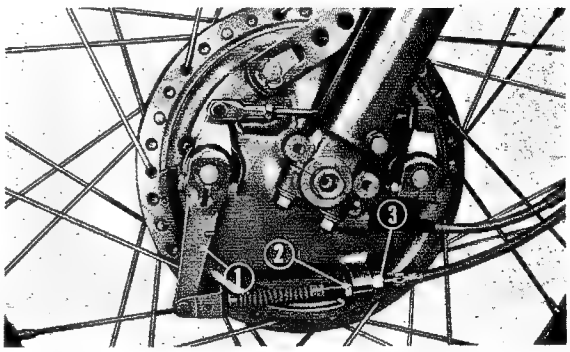
1. Front brake

   a. The brake lever play is the stroke between the narmal lever position and the position of the lever where the brake starts working. The brake lever free play should be 15 to 30 mm (0.6 to 1.2 in) at the tip of the brake lever. (Fig. 6–40)



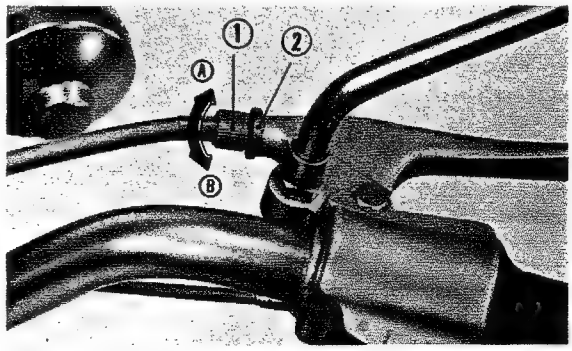
① 15~30 mm (0.6~1.2 in)
Fig. 6–40. Front brake lever play

   b. If the brake requires adjustment, there are two places where this adjustment can be made. Normally the adjustment is made at the brake lever arm on the front brake panel. First, loosen the lock nut and then turn the adjusting nut. Turning the nut IN (clockwise) will decrease the brake lever play and turning OUT (counterclockwise) will increase the play. (Fig. 6–41)

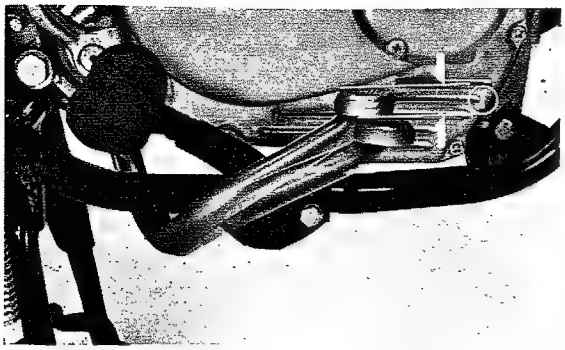


① Front brake arm ② Lock nut ③ Adjusting nut
Fig. 6–41. Front brake adjustment A

   c. Minor adjustment is made with the round adjusting bolt on the front brake lever by rotating in the same manner as above. (Fig. 6–42)

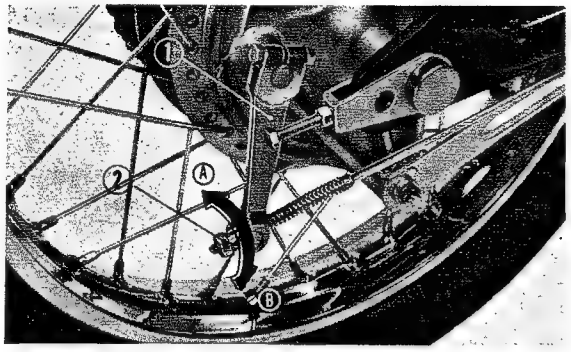


① Front brake adjusting bolt ② Locking nut
Ⓐ Decreasing the brake lever play
Ⓑ Increasing the brake lever play
Fig. 6–42. Front brake adjustment B



① 20~30 mm (0.8~1.2 in)
Fig. 6-43. Rear brake pedal play

2. Rear brake
   a. Raise the rear wheel off the ground and check the free play of the brake pedal in the same way as for the front brake. The brake pedal play should be 20 to 30 mm (0.8 to 1.2 in). (Fig. 6-43)

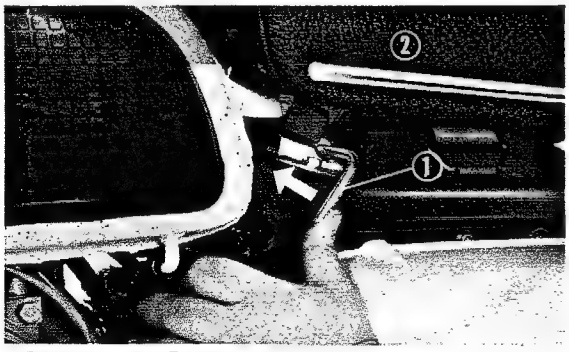


① Rear brake arm ② Adjusting nut
Ⓐ Increasing the free play Ⓑ Decreasing the free play
Fig. 6-44. Rear brake adjustment

   b. The adjustment is made with the brake arm on the rear brake pedal. Turning the adjusting nut IN (clockwise) will decreases the free play of the brake pedal, and turning OUT (counterclockwise) will increase the free play. (Fig. 6-44)

E. Battery Inspection

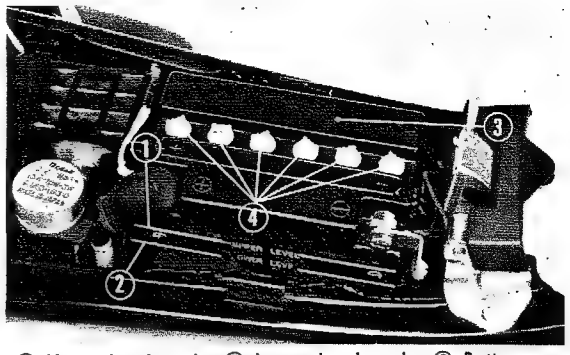
The battery electrolyte level lowers after long usage, therefore, it should be replenished periodically. When the level is lowered, and the plates are exposed, the charge accepting capacity is reduced. For this reason, the electrolyte must always be maintained up to the proper level and kept in the best condition. The 12V – 12AH battery is mounted under the seat.



① Seat latch ② Dual seat
Fig. 6-45. Seat latch

1. Access to the battery is made by releasing the seat latch on the front end under the seat and by raising the front of the seat. Use the stay which is attached to the under side of the seat to hold the seat in the raised position. (Fig. 6-45)

2. Electrolyte level must be between the lower limit and upper limit. When the level is low, add only distilled water up to the upper level. (Fig. 6-46)
3. Distilled water should be poured through the filler holes after removing the battery holding strap and the yellow filler caps. The levels in all six cells should be the same.



① Upper level mark ② Lower level mark ③ Battery
④ Yellow filler caps
Fig. 6-46. Battery inspection

NOTE :

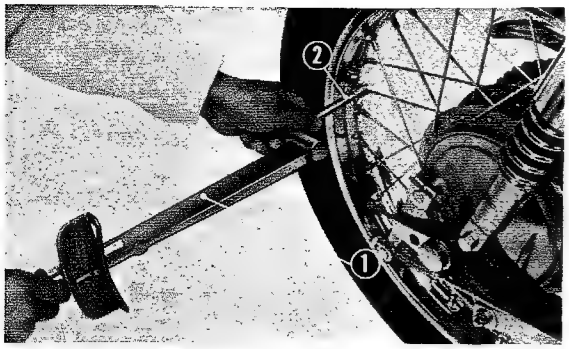
- When replenishing electrolyte, do not add dilute sulfuric acid, distilled water only should be adds.
- When the level of electrolyte lowers quickly, check the charging efficiency.
- Insure that the breather tube is not clogged.
- When removing the battery, first disconnect wiring on the negative (—) terminal, and then the positive (+) terminal. Otherwise, it may cause shortcircuiting, shock or unreasonable load may be applied to the battery.
- Grease around the terminals slightly to prevent corrosion.
- Wirings should be connected securely on the battery.

F. Checking Parts for Tightness

1. Important nuts and bolts

   Some nuts and bolts apt to become loose due to vibration and for wear. To present this, the major parts (shown in the following table) must be retightened periodically. Use a torque wrench for retightening, and tighten to the proper torque value.

   (1) Front wheel axle nut and rear wheel axle nut.
   (2) Front and rear shock absorbers mounting bolts and nut.
   (3) Rear fork pivot bolt and nut.
   (4) Front brake stop arm (both end) mounting bolts.
   (5) Rear brake stop arm latch clip and nut.
   (6) Steering stem nut and handlebar mounting bolts.
   (7) Engine hanger bolt and nut.
   (8) Front and rear wheel spokes.



① Spoke nipple torque wrench ② Nipple wrench
Fig. 6-47. Retightening spoke

2. Spokes

If the motorcycle is driven with loose wheel spokes the rims, other spokes will be spoiled. For this reason, the spokes should be tightened after the first 1000 miles followed by re-tightening at every 6000 miles thereafter. With the front wheel lifted, turn the wheel, and retighten loose sope nipple properly so that all are tightened equally.

Use the nipple rench. (Fig. 6-47)

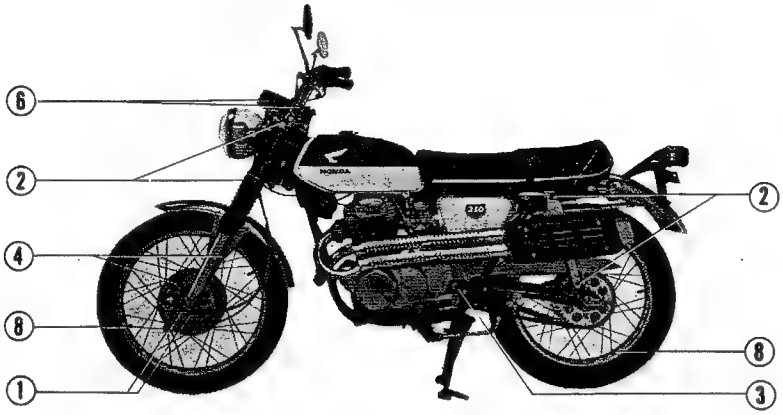


Fig. 6-48. Left side

① Front wheel axle holder nut
② Front and rear suspension mounting bolt and nut
③ Rear fork pivot bolt and nut
④ Front brake stop arm (both end) munting
⑤ Rear brake stop arm latch clip and nut
⑥ Steering stem nut and handlebar mounting bolt
⑦ Engine hanger bolt and nut
⑧ Front and rear wheel spokes

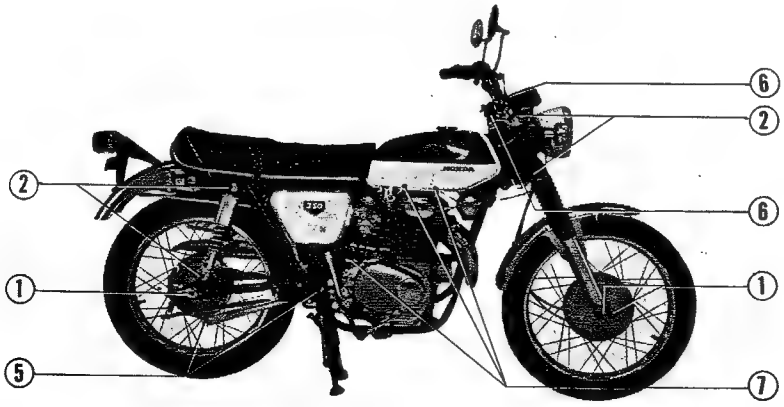


Fig. 6-49. Right side

6.2 PERIODICAL INSPECTION AND MAINTENANCE

Tightening Torque Standard

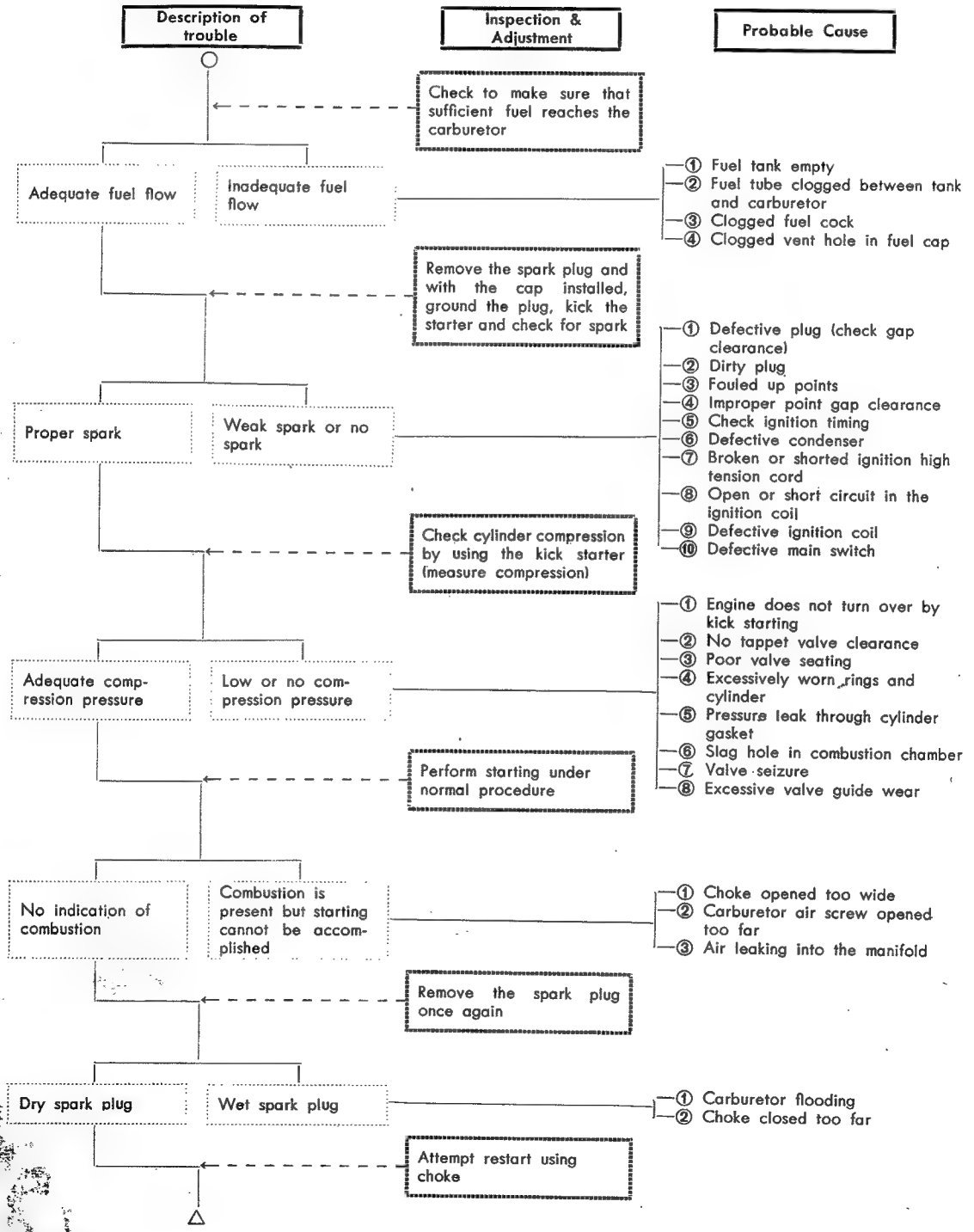
Classification	No.	Location	Part tightened	Tightening torque
Front fork	1	Front brake arm (panel side)	Front brake torque bolt	180~250 kg. cm
	2	Front brake arm (fork side)	Front brake torque bolt	180~250 kg. cm
	3	Front fork top bridge	16mm front fork bolt	700~800 kg. cm
	4	Front cushion under holder	8mm front cushion under holder nut	180~250 kg. cm
	5	Front wheel axle	12mm front axle nut	550~650 kg. cm
	6	Steering stem	24mm steering head stem head nut	800~1200 kg. cm
	7	Steering bottom bridge	8mm steering stem bottom bridge bolt	180~250 kg. cm
	8	Headlight case	10mm headlight case mounting bolt	300~400 kg. cm
Steering handle	9	Handle pipe holder	8mm×32mm hex. bolt	180~250 kg. cm
Frame	10	Engine front under mounting	10mm engine mounting nut (NH10)	350~450 kg. cm
	11	Engine rear upper and lower mounting	10mm engine mounting nut	350~450 kg. cm
	12	Engine upper hanger plate	8mm engine upper hanger plate nut	180~250 kg. cm
	13	C.L. muffler hanger plate (upper)	10×60mm hex. bolt	350~400 kg. cm
	14	C.L. muffler hanger plate (under)	8×.18mm hex. bolt	200~250 kg. cm
	15	Dual sheet mounting	8mm dual sheet mounting nut	180~250 kg. cm
	16	Rear fender	8×18mm or 8×22 hex. bolt	200~300 kg. cm
	17	Rear brake pedal	12mm rear brake pedal pivot bolt	350~450 kg. cm
	18	Rear fork pivot bolt	14mm self-locking nut	550~700 kg. cm
	19	Rear cushion upper joint	NCA 10mm cap nut	350~450 kg. cm
	20	Rear cushion lower	10×32 hex. bolt	350~450 kg. cm
	21	Rear wheel axle	16mm rear axle nut	800~1000 kg. cm
	22	Rear brake stopper arm	8mm rear brake torque bolt	180~250 kg. cm

6.3 TROUBLE SHOOTING

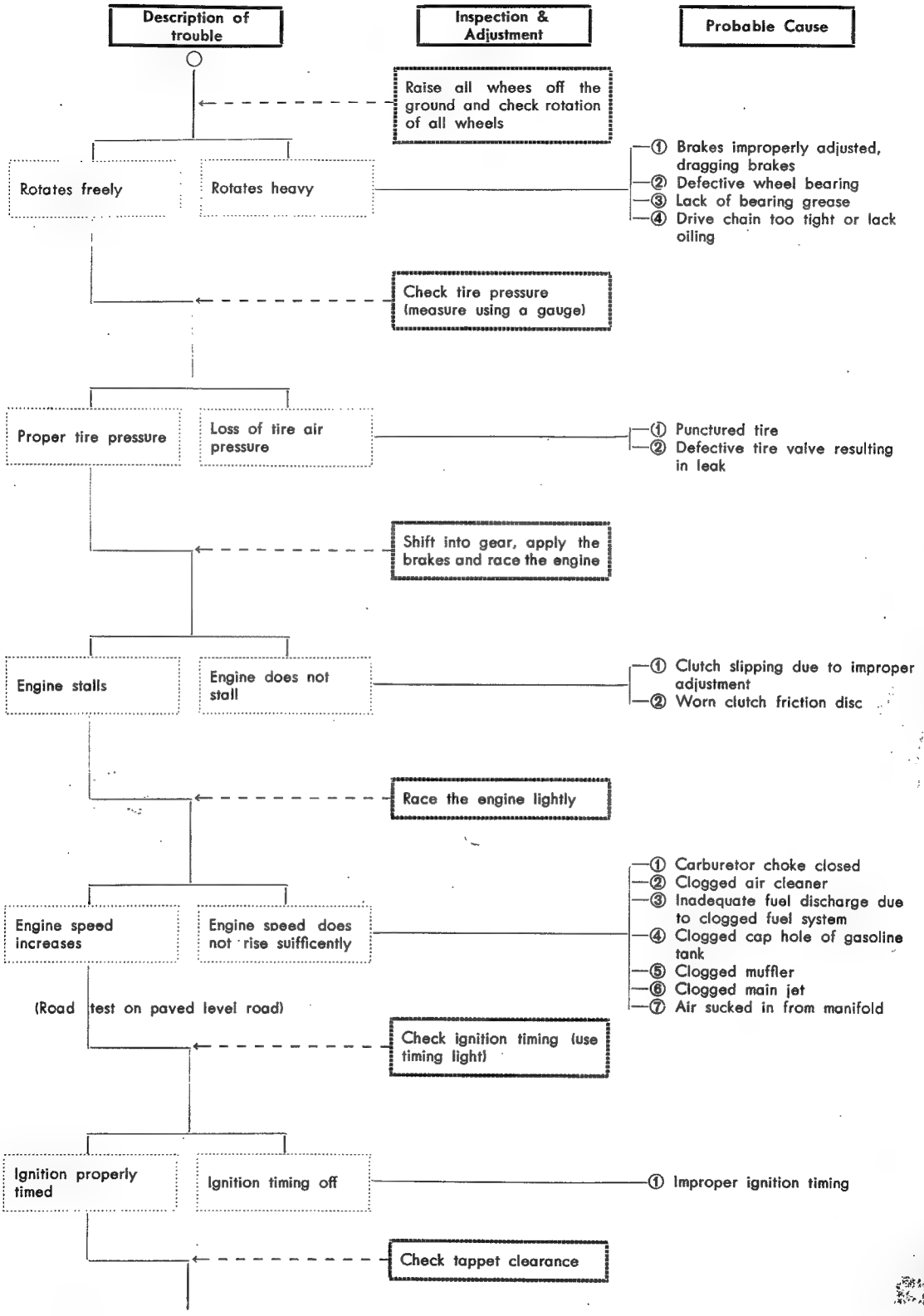
When trouble develops, the most important thing is to first locate the cause of the trouble. The chart shows the procedure, sequence to follow, and the most direct method to perform the correct diagnoses. The diagnosing procedures and the probable causes are shown separately for each trouble, and therefore, the appropriate corrective action can be taken for the respective cause.

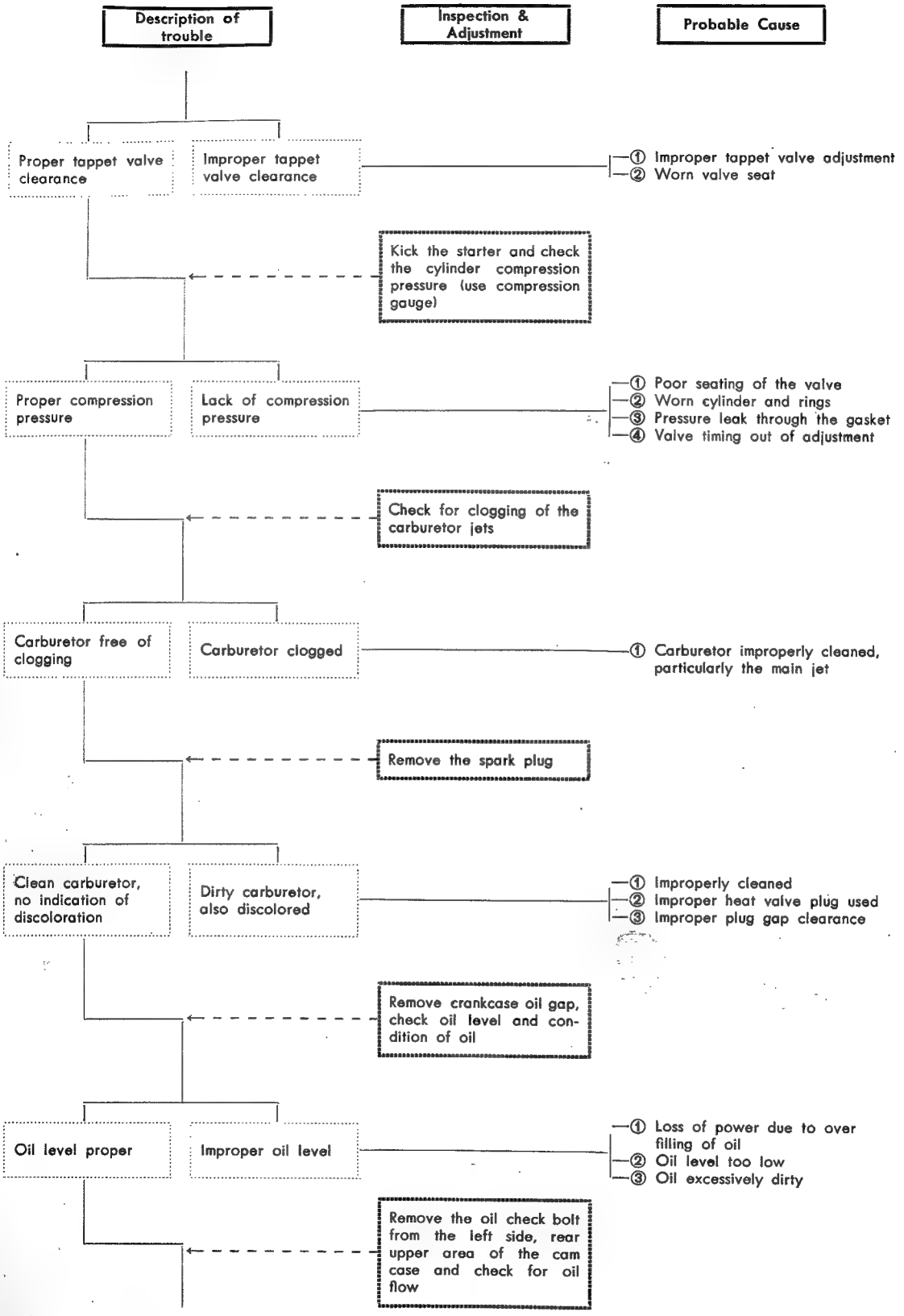
The o in the chart indiacates [ ], and the indicates the motorcycle which has had the trouble corrected.

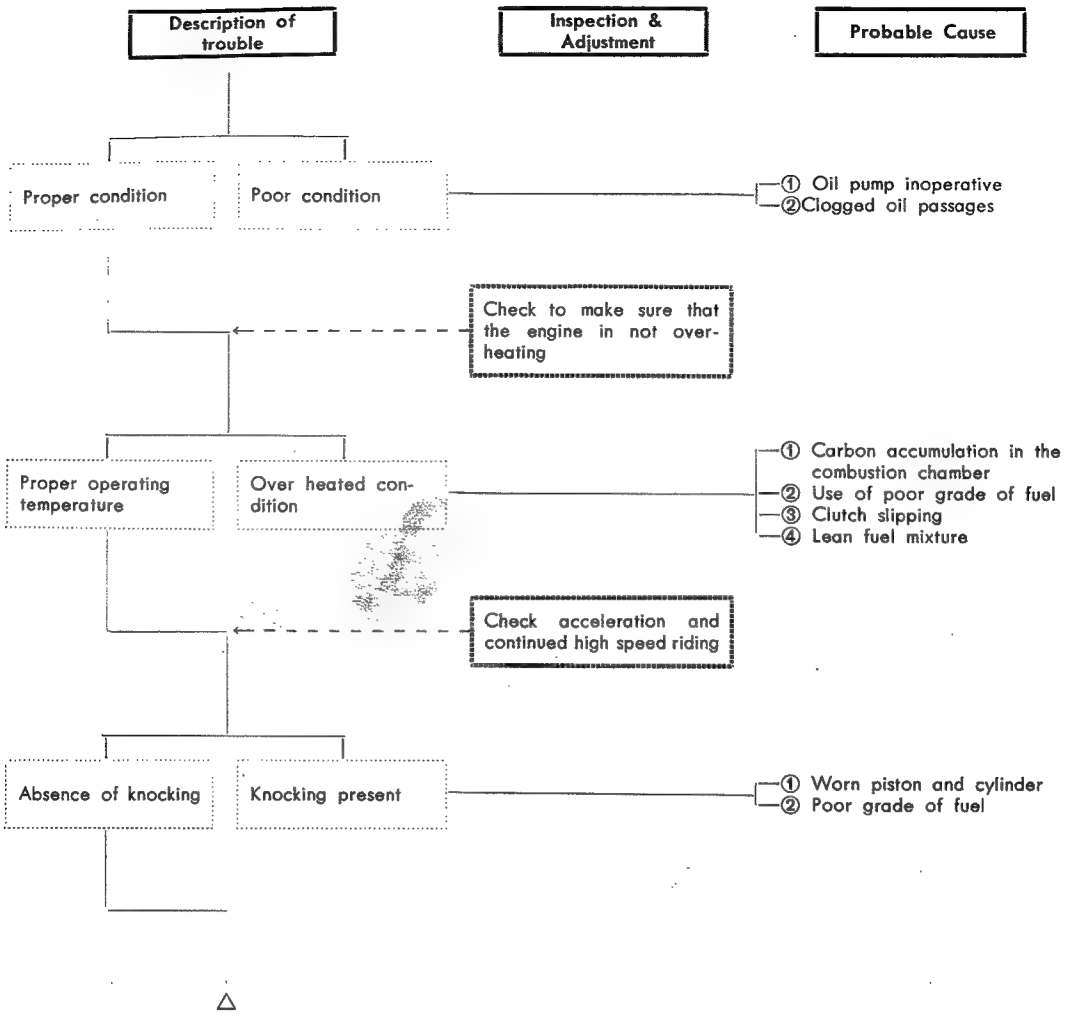
A. Engine does not start of hard starting



B. Loss of speed and drop in power

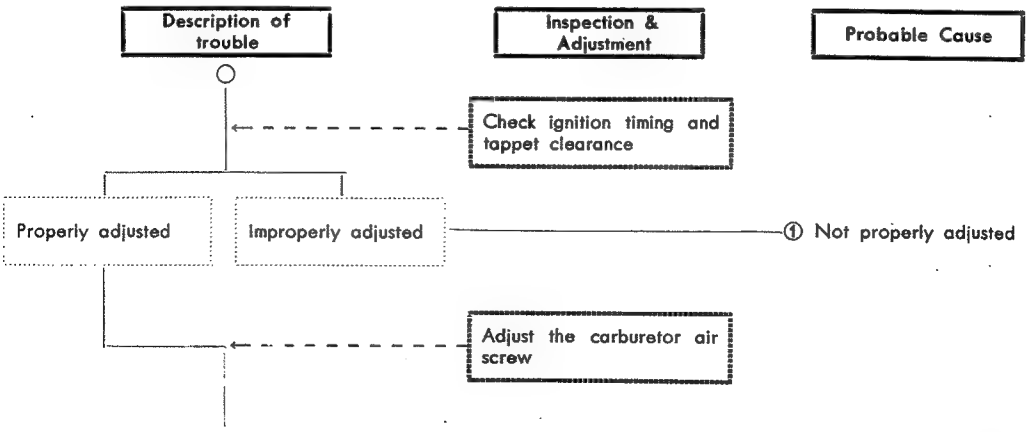


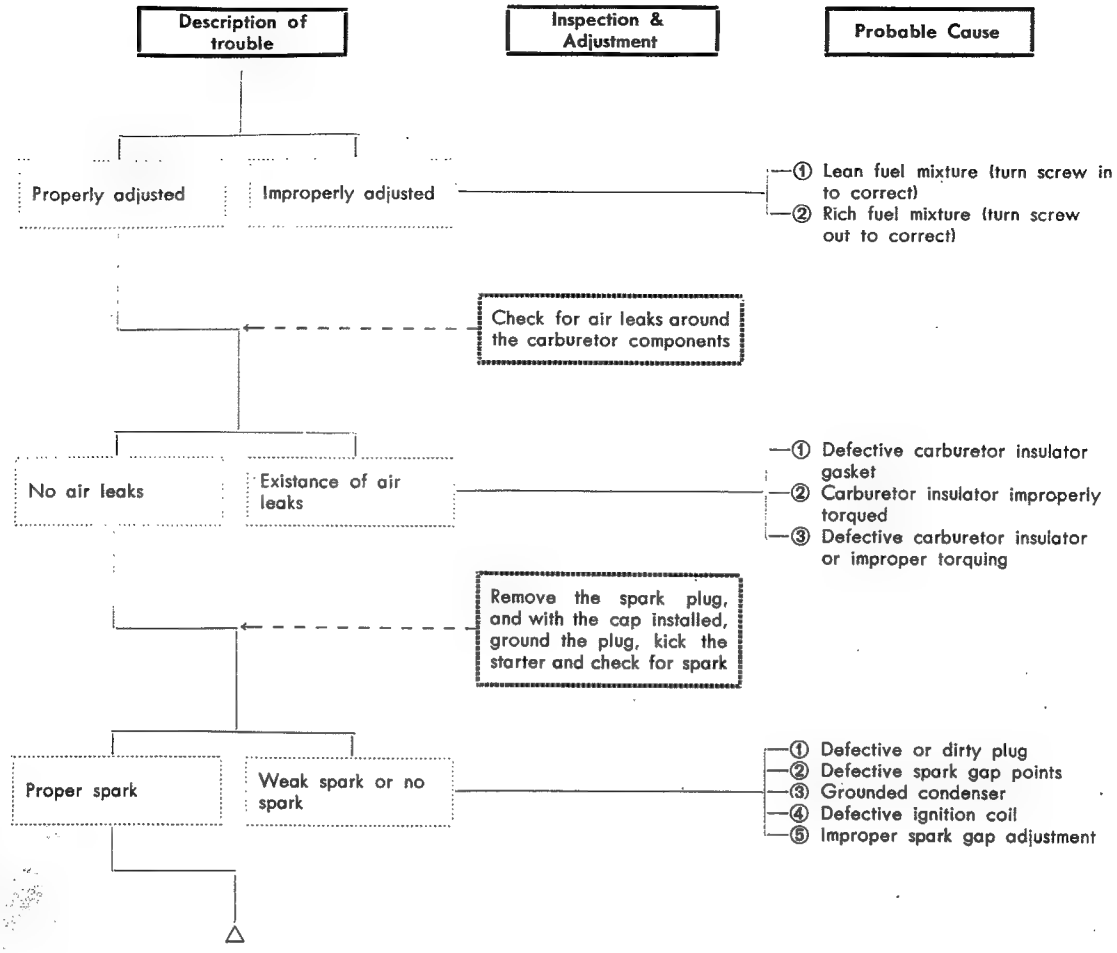

Description of trouble
Inspection & Adjustment
Probable Cause
Proper tappet valve clearance
Improper tappet valve clearance
① Improper tappet valve adjustment
② Worn valve seat
Kick the starter and check the cylinder compression pressure (use compression gauge)
Proper compression pressure
Lack of compression pressure
① Poor seating of the valve
② Worn cylinder and rings
③ Pressure leak through the gasket
④ Valve timing out of adjustment
Check for clogging of the carburetor jets
Carburetor free of clogging
Carburetor clogged
① Carburetor improperly cleaned, particularly the main jet
Remove the spark plug
Clean carburetor, no indication of discoloration
Dirty carburetor, also discolored
① Improperly cleaned
② Improper heat valve plug used
③ Improper plug gap clearance
Remove crankcase oil gap, check oil level and condition of oil
Oil level proper
Improper oil level
① Loss of power due to over filling of oil
② Oil level too low
③ Oil excessively dirty
Remove the oil check bolt from the left side, rear upper area of the cam case and check for oil flow



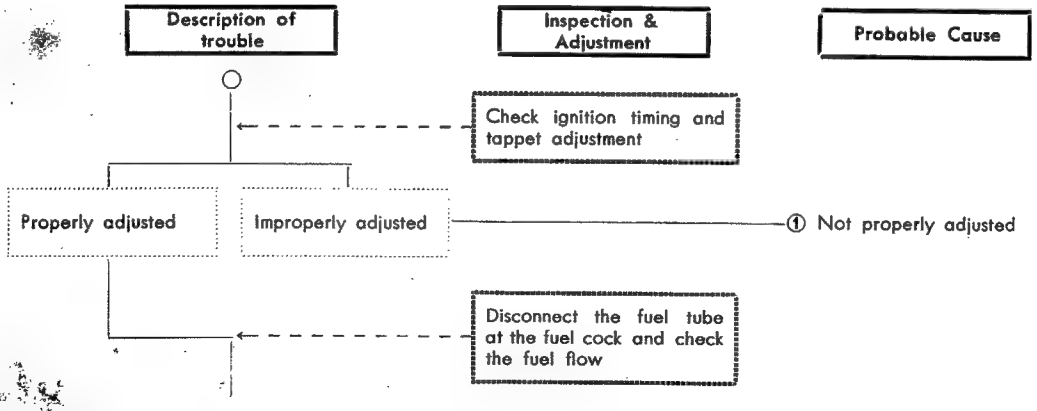
△

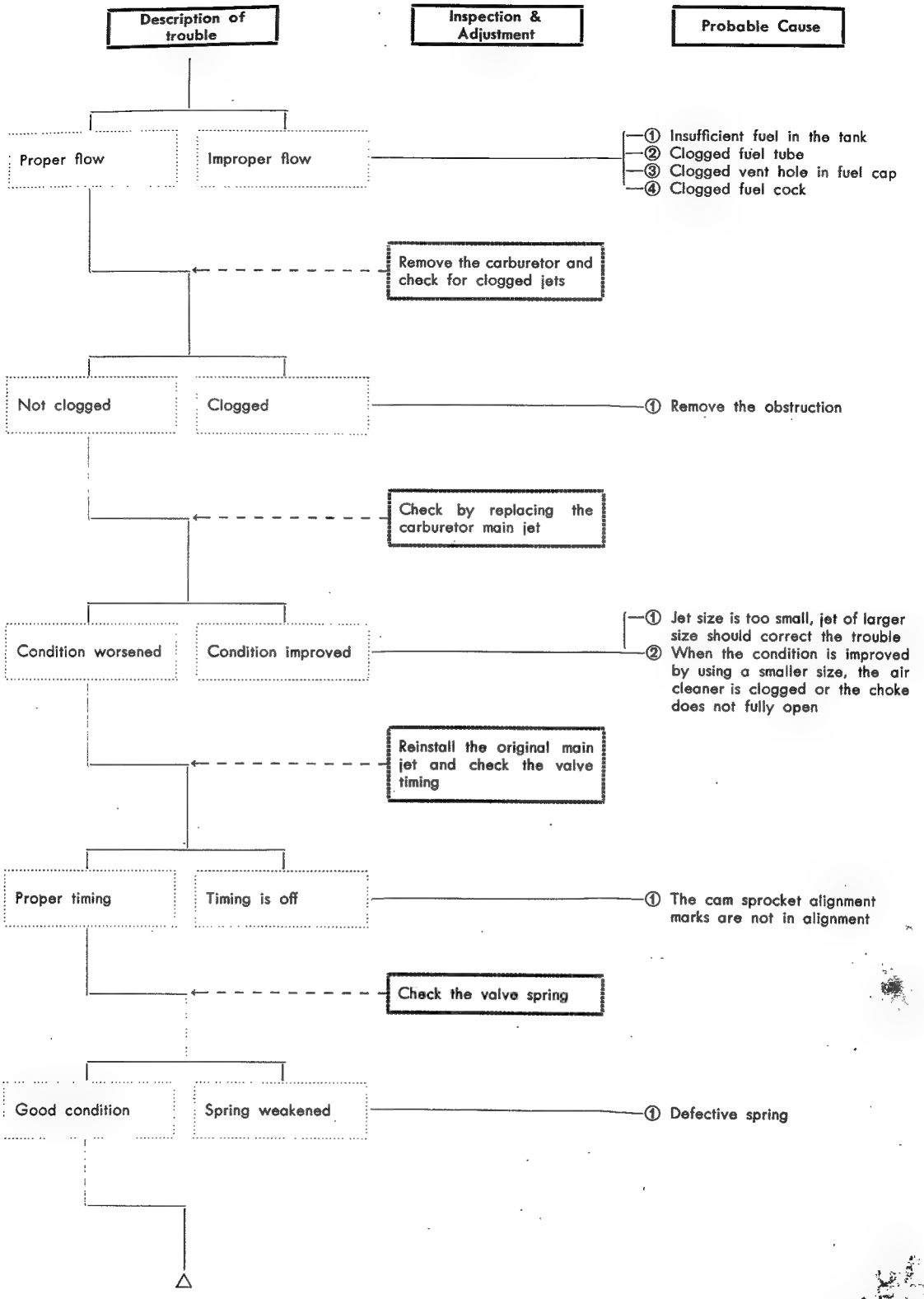
C. Improper rpm (Particularly at low speed and idling)





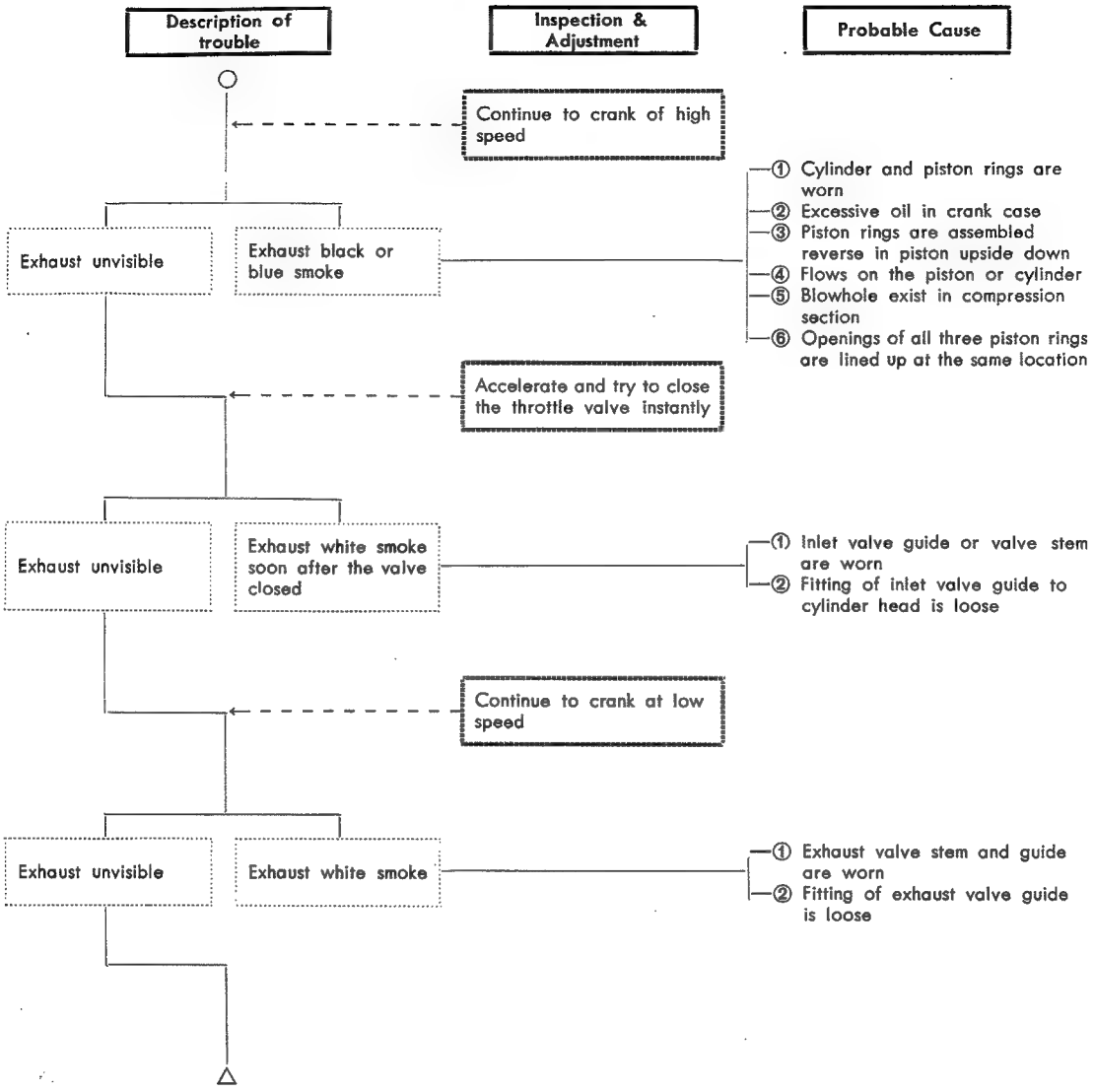
D. Improper rpm (high speed)



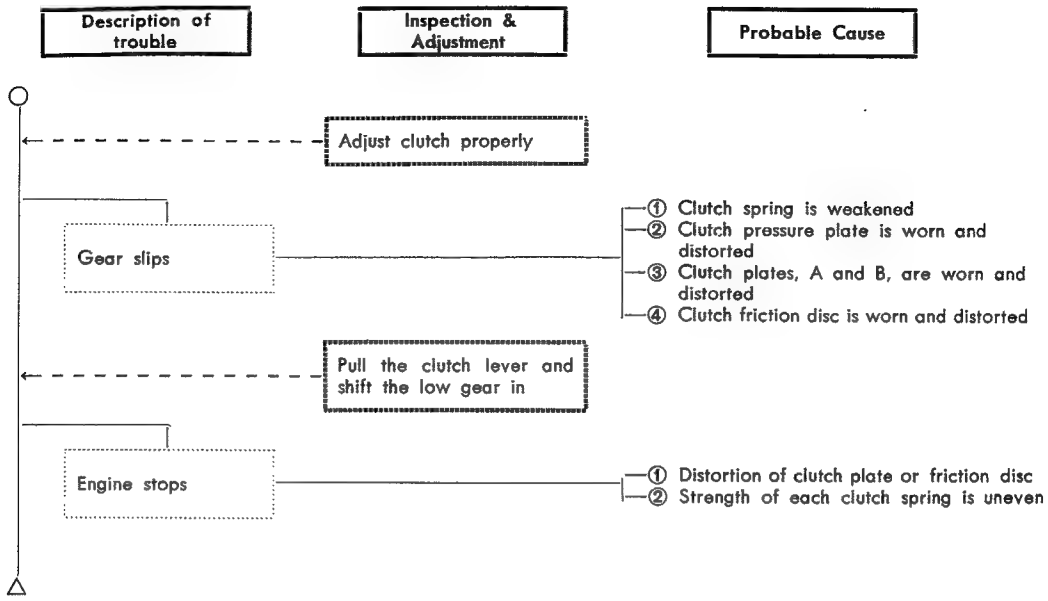

Description of trouble
Inspection & Adjustment
Probable Cause
Proper flow
Improper flow
① Insufficient fuel in the tank
② Clogged fuel tube
③ Clogged vent hole in fuel cap
④ Clogged fuel cock
Remove the carburetor and check for clogged jets
Not clogged
Clogged
① Remove the obstruction
Check by replacing the carburetor main jet
Condition worsened
Condition improved
① Jet size is too small, jet of larger size should correct the trouble
② When the condition is improved by using a smaller size, the air cleaner is clogged or the choke does not fully open
Reinstall the original main jet and check the valve timing
Proper timing
Timing is off
① The cam sprocket alignment marks are not in alignment
Check the valve spring
Good condition
Spring weakened
① Defective spring
△

E. Excessive oil consumption

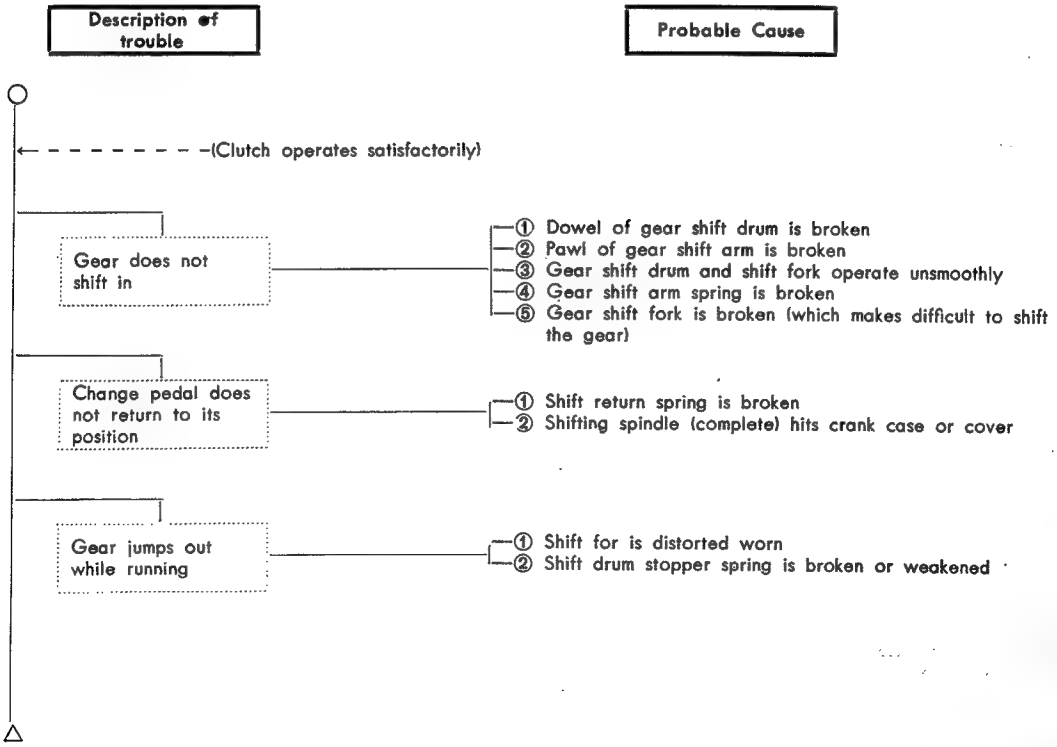
Exhaust blue or block smoke



F. Clutch operates faulty



G. Shift operates faulty



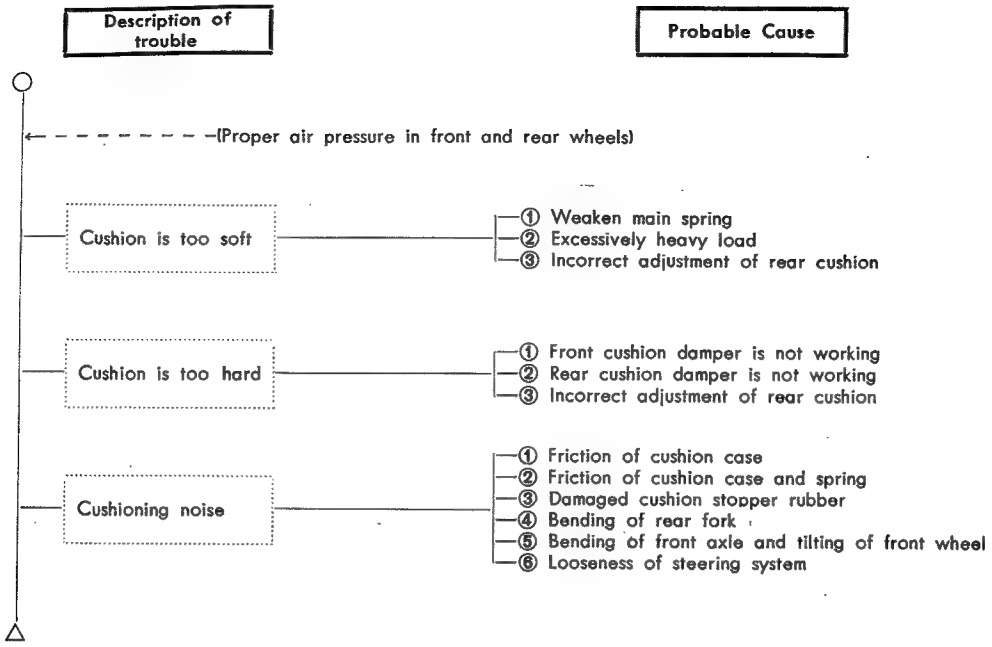
H. Engine runs with unusual noise

Description of trouble	Probable Cause
Tappet noise	① Excessive clearance in tappet ② Rocker arms are worn unevenly
Knocking noise from piston	① Piston and cylinder are worn ② Accumulation of carbon in combustion chamber ③ Wear of piston pin and piston end of connecting rod
Cam chain noise	① Expansion of chain ② Teeth of cam sprocket and timing sprocket are worn ③ Cam chain tensioner operates unsatisfactorily
Knocking noise from clutch	① Excessive looseness of teeth of clutch friction disc and clutch outer ② Looseness of clutch center spline
Crank noise	① Swinging of crankshaft ② Looseness of bearing of crankshaft
Primary gear noise	① Wear or friction of primary gear ② Wear or primary gear damper

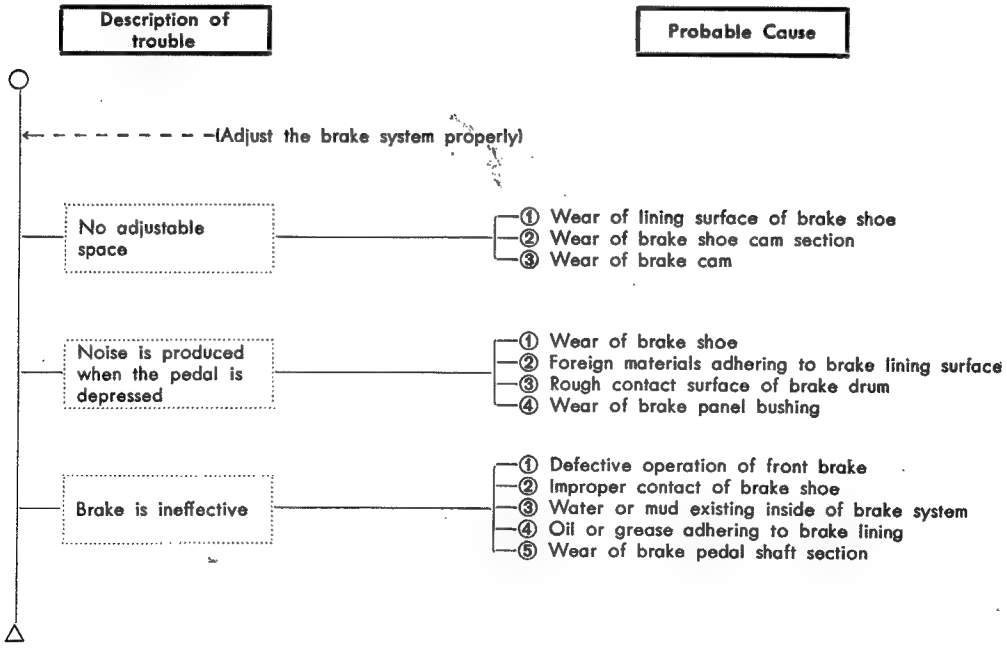
I. Vehicle steers faulty

Description of trouble	Probable Cause
← (Inflate front and rear tires to specified air pressure)	
Hard steering	① Over tighten of steering ball race ② broken steering steel ball ③ Bending of steering stem ④ Over tighten of steering damper
Front or rear wheel wander	① Looseness of bearings of front and rear wheels ② Deformation of rims of front and rear wheels ③ Looseness of spokes ④ Looseness of rear fork pivot bushing and center collar ⑤ Distortion of frame ⑥ Incorrect adjustment of drive chain adjuster ⑦ Defective tire ⑧ Looseness of steering system
Tends to skid to one side	① Left and right cushion of front or rear are unbalanced ② Center of front and rear wheels are not aligned ③ Bending of front fork ④ Bending of rear fork ⑤ Bending of front axle and tilting of front wheel ⑥ Looseness of steering system

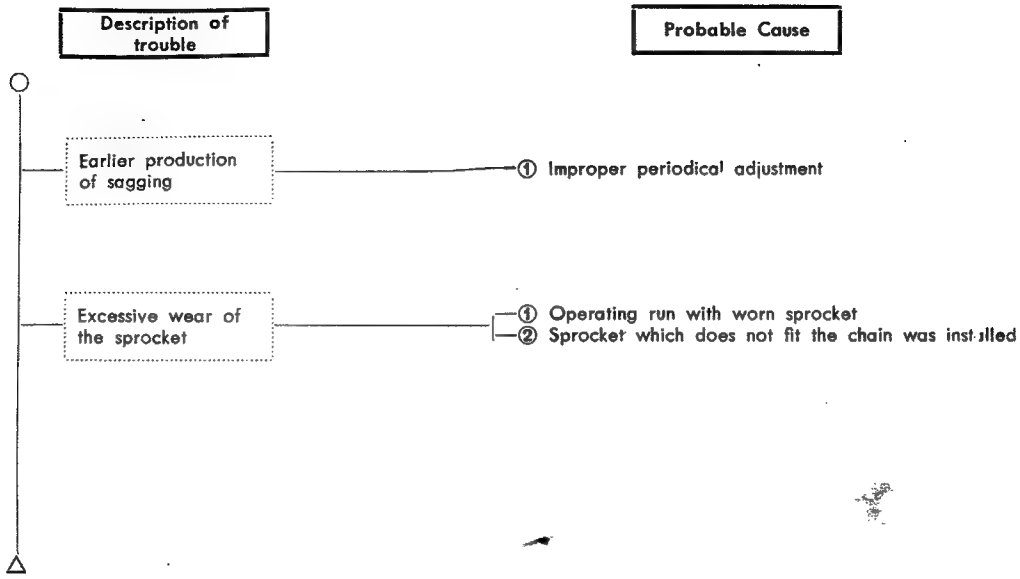
J. Front or rear suspension functions faulty



K. Defective brake

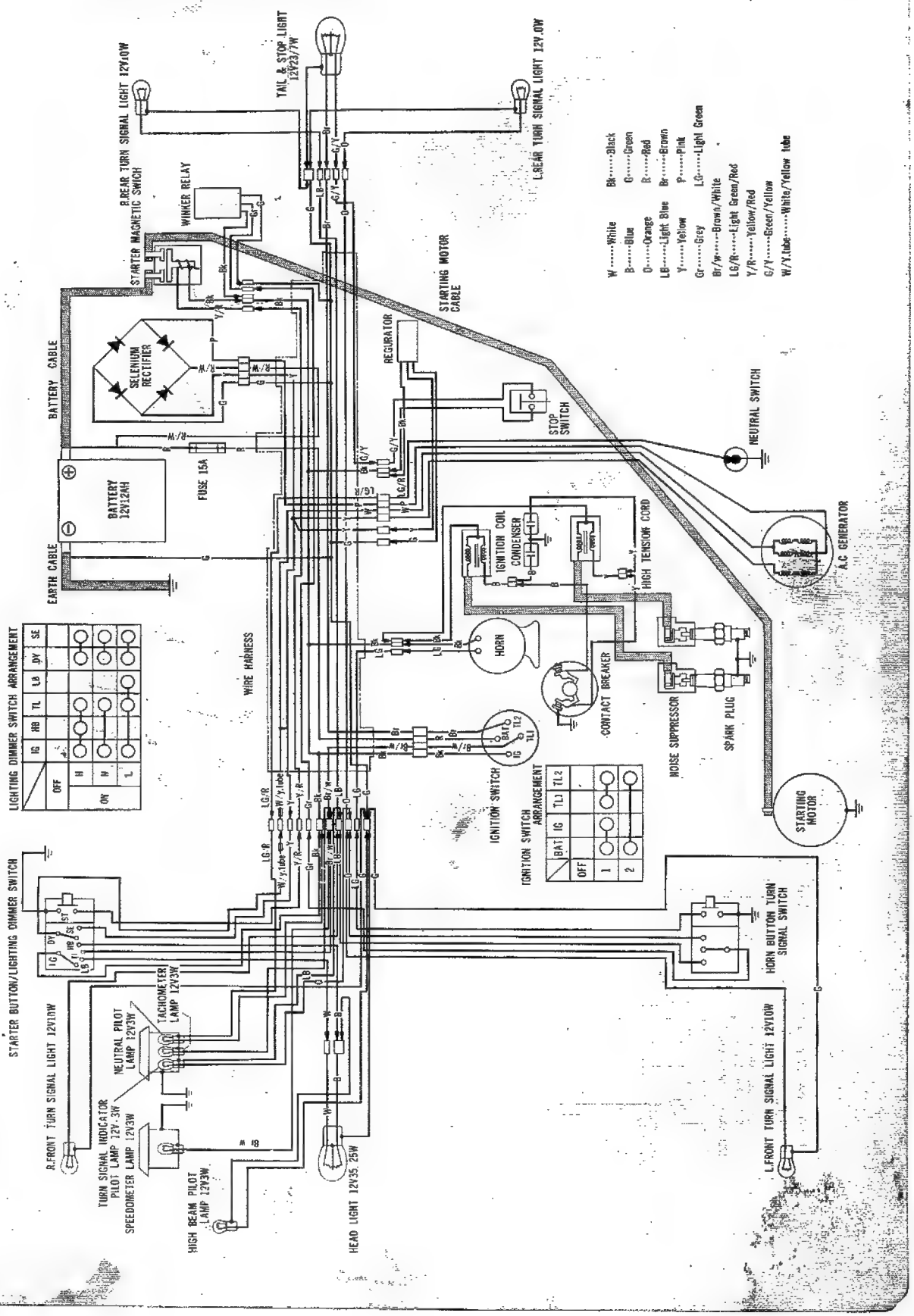


L. Quick expansion of drive chain

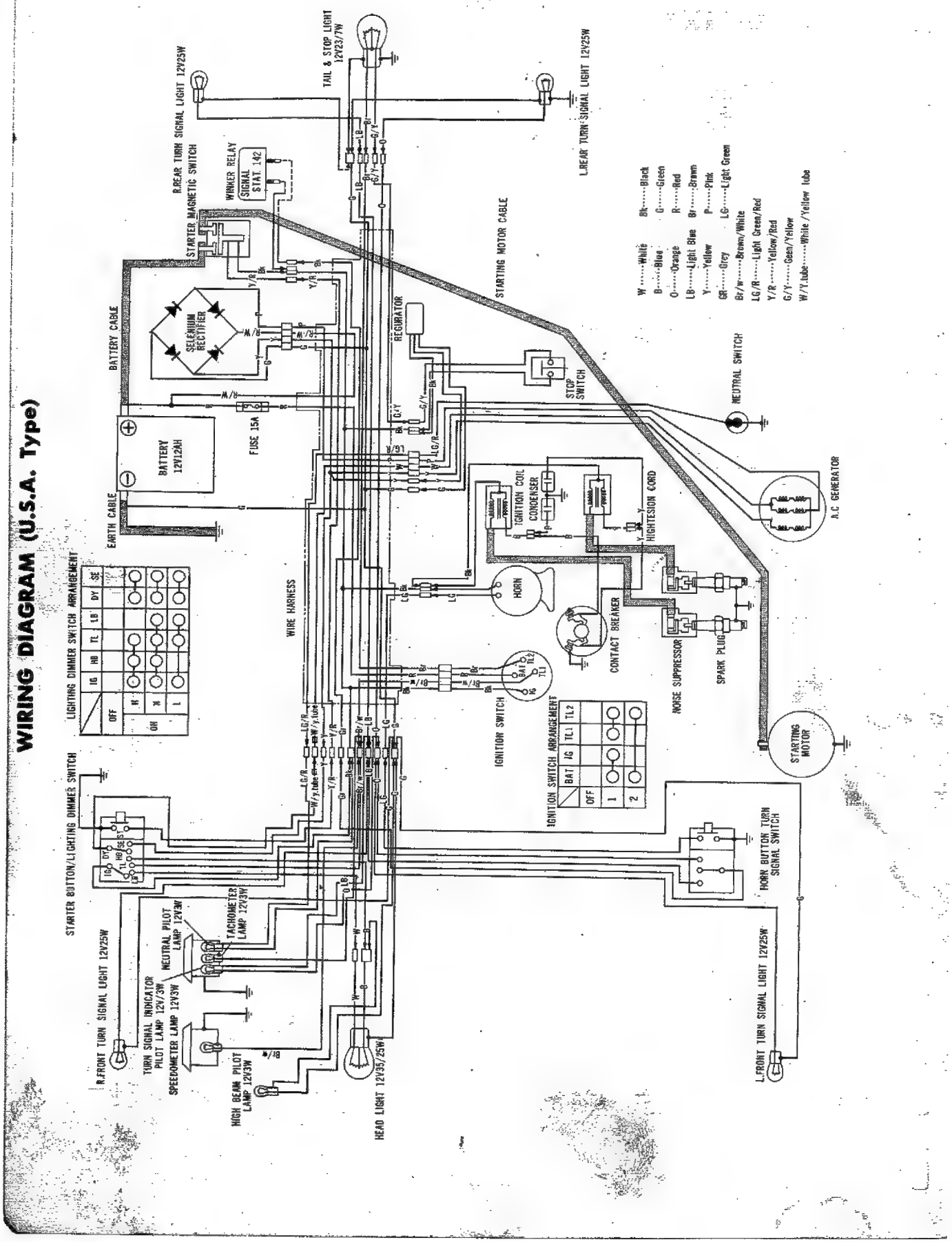


7. WIRING DIAGRAM

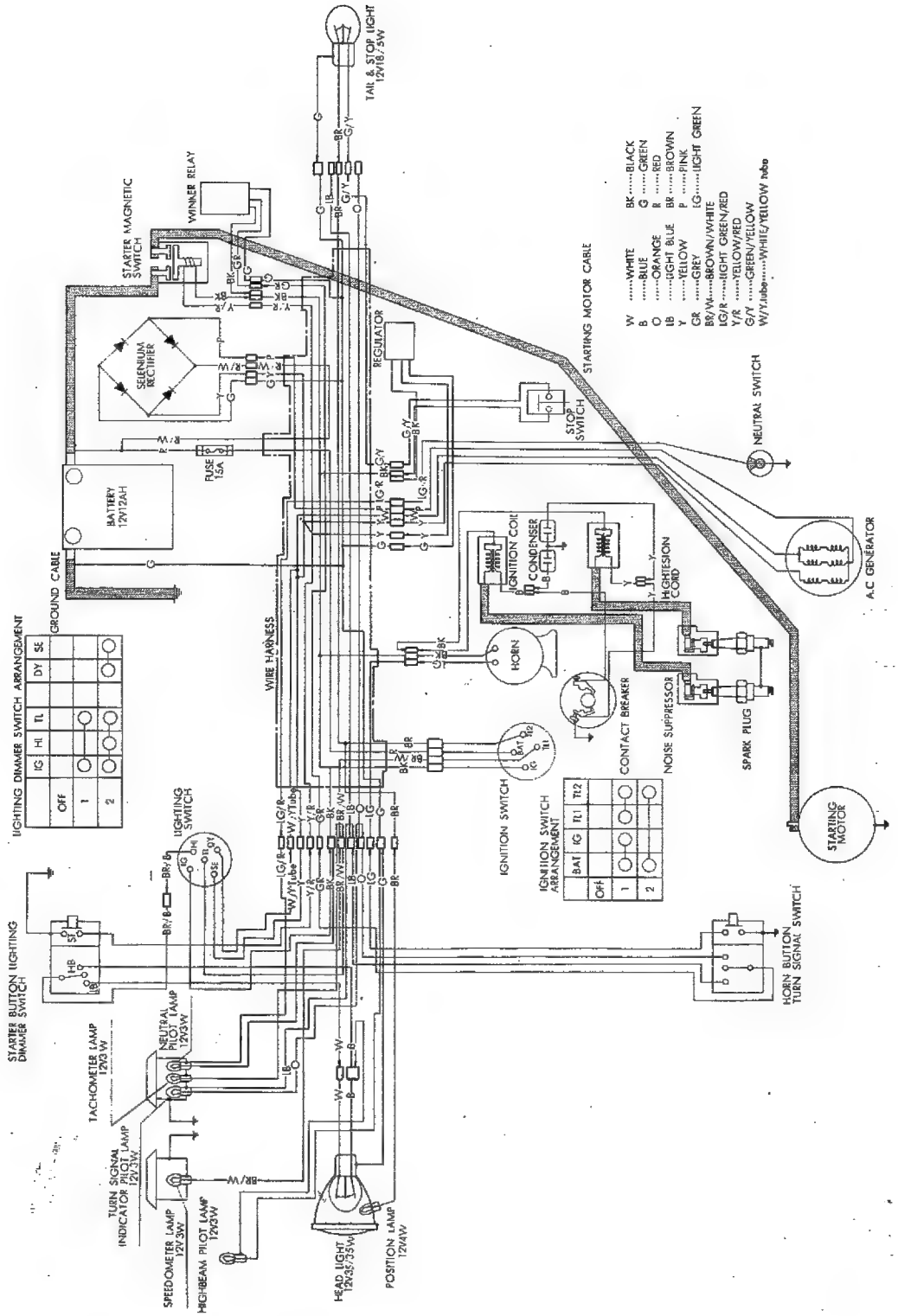
WIRING DIAGRAM (General Type)



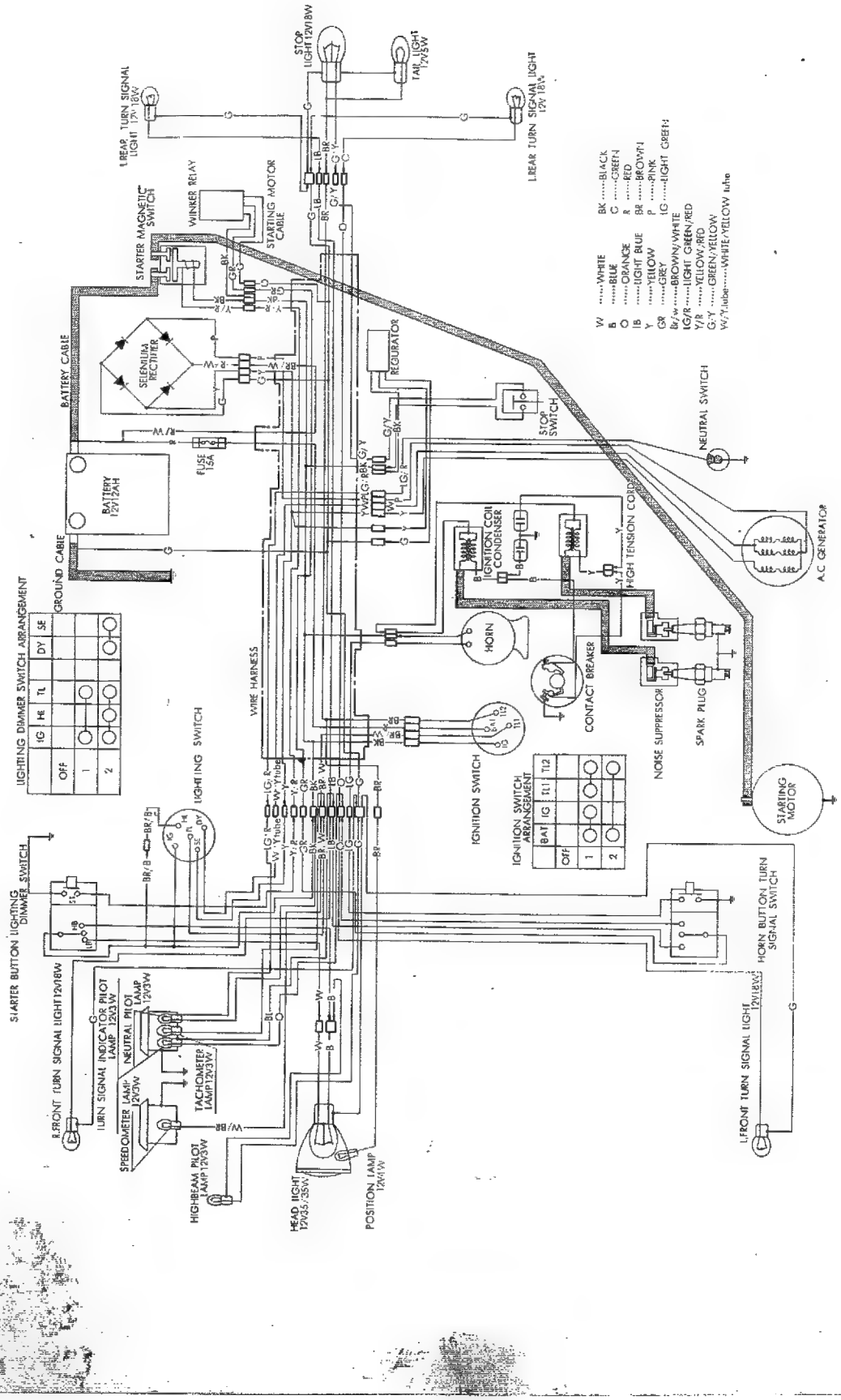
WIRING DIAGRAM (U.S.A. Type)



WIRING DIAGRAM (U.K. Type)



WIRING DIAGRAM (Germany Type)



HONDA 250/350
MODELS CB/CL250 • CB/CL350
SHOP MANUAL

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SHOP MANUAL

HONDA SL350

SHOP MANUAL SUPPLEMENT

HONDA 250 · 350

FOREWORD

A new model, the SL 350, has been added to the 250cc–350cc series motorcycles (CB 250/350, CL 250/350). This new model uses the same basic frame and engine, therefore, a Shop Manual Supplement is published rather than a completely new manual.

This supplement contains only information peculiar to the SL 350 and will be used in conjunction with the HONDA 250•350 Shop Manual on those sections which are common.

When seeking information on the SL 350, refer to both the SL 350 supplement and the basic HONDA 250•350 Shop Manuals. The index on the following pages are keyed to the pages of both manuals.

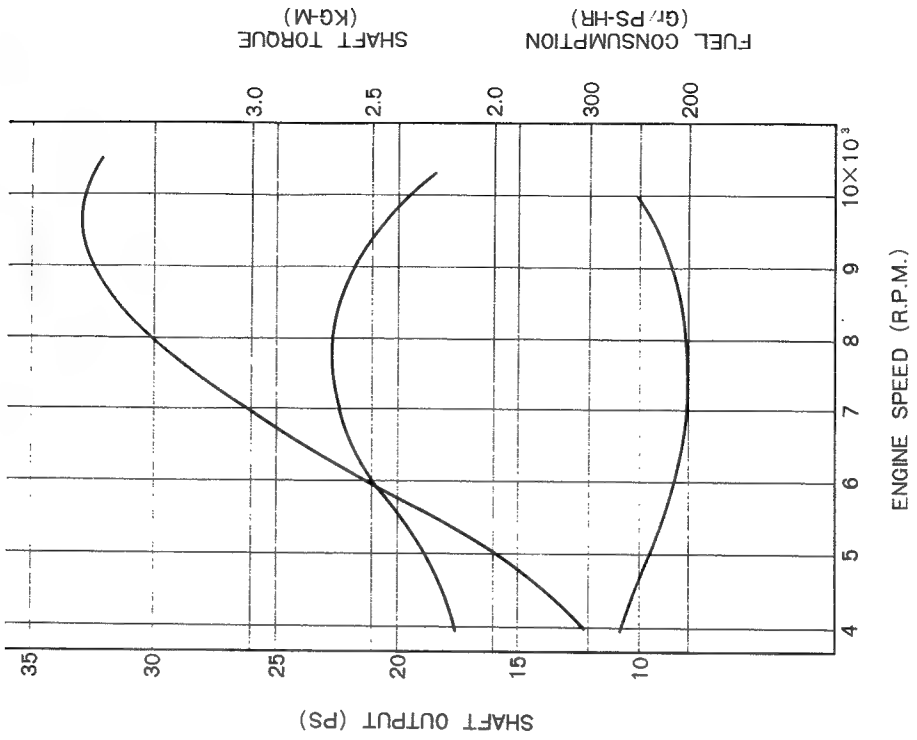
CONTENTS

1. TECHNICAL DATA

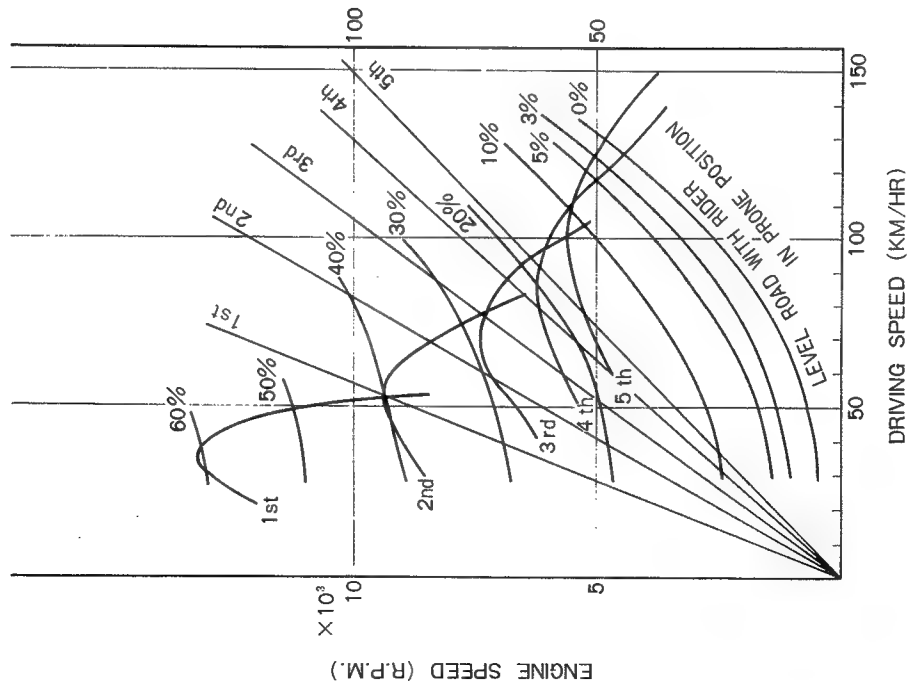
Item	English	Metric
DIMENSION		
Overall length	79.5 in	2,020 mm
Overall width	33.3 in	845 mm
Overall height	46.5 in	1,180 mm
Wheel base	52.8 in	1,340 mm
Seat height	33.1 in	840 mm
Foot peg height	12.6 in	320 mm
Ground clearance	8.3 in	210 mm
Curb weight	363.8 lb	165 kg
Weight distribution F/R	172/191.8 lb	78/87 kg
FRAME		
Type	Semi-double cradle	
Suspension, F	Telescopic fork	
Suspension, R	Swinging arm, de carbon suspension	
Tire size, F	3.25–19 (4 PR)	
Tire size, R	4.00–18 (4 PR)	
Brake, F, lining area	Internal expanding shoe, 8.09 sq. in × 2 (52.2 sq. cm × 2)	
Brake, R, lining area	Internal expanding shoe, 7.9 sq. in × 2 (51.0 sq. cm × 2)	
Fuel capacity	2.4 U.S. gal. 2.0 Imp. gal.	9.0 lit.
Fuel reserve capacity	4.2 U.S. pt. 3.5 Imp. pt.	2.0 lit.
Caster angle	62°20′	
Trail length	4.33 in	110 mm
ENGINE		
Type	O.H.C. twin-cylinder, air cooled, 4-cycle	
Cylinder arrangement	Two cylinders in tandem	
Bore and Stroke	2.52 × 1.992 in	64 × 50.6 mm
Displacement	19.8 cu-in	325 cc
Compression ratio	9.5	
Carburetor	Keihin, constant velocity	
Valve train	Chain driven overhead camshaft	
Maximum horsepower	33 PS/9,500 rpm	
Maximum torque	19.3 lb-ft/8,000 rpm	2.67 kg-m/8,000 rpm
Oil capacity	4.6 U.S. pt. 3.9 Imp. pt.	2.2 lit.
Lubrication system	Forced pressure and wet sump	
Engine weight(include oil)	119.1 lb	54 kg

Item	English	Metric
DRIVE TRAIN		
Clutch	Multi-plate, wet type	
Transmission	5 speed, constant mesh	
Primary reduction	3.714	
Gear ratio 1st	2.353	
2nd	1.636	
3rd	1.267	
4th	1.036	
5th	0.900	
Final reduction	2.500	
Gear shift pattern	Left foot return type system	
ELECTRICAL		
Ignition	Battery and ignition coil	
Starting System	Starting motor and kick pedal	
Alternator	AC generator	
Battery capacity	12 V–12 AH	
Spark plug	NGK B–8ES	
PERFORMANCE		
Max speed in gear 1st	34 mph	54 kph
2nd	49 mph	78 kph
3rd	63 mph	101 kph
4th	77 mph	123 kph
5th	80 mph	130 kph
Fuel consumption	115 mile/U.S. gal. at 22 mph	50 km/lit. at 35 kph
	140 mile/Imp. gal. at 22 mph	
Climbing ability	25°	
Turning circle	13.8 ft	4.2 m
Braking distance	50 ft. at 31 mph	15 m at 50 kph
Special equipment	Headlight bulb : 12 V–35/25 W Tail/stoplight bulb : 12 V–7/23 W	

SL 350 ENGINE PERFORMANCE CURVE

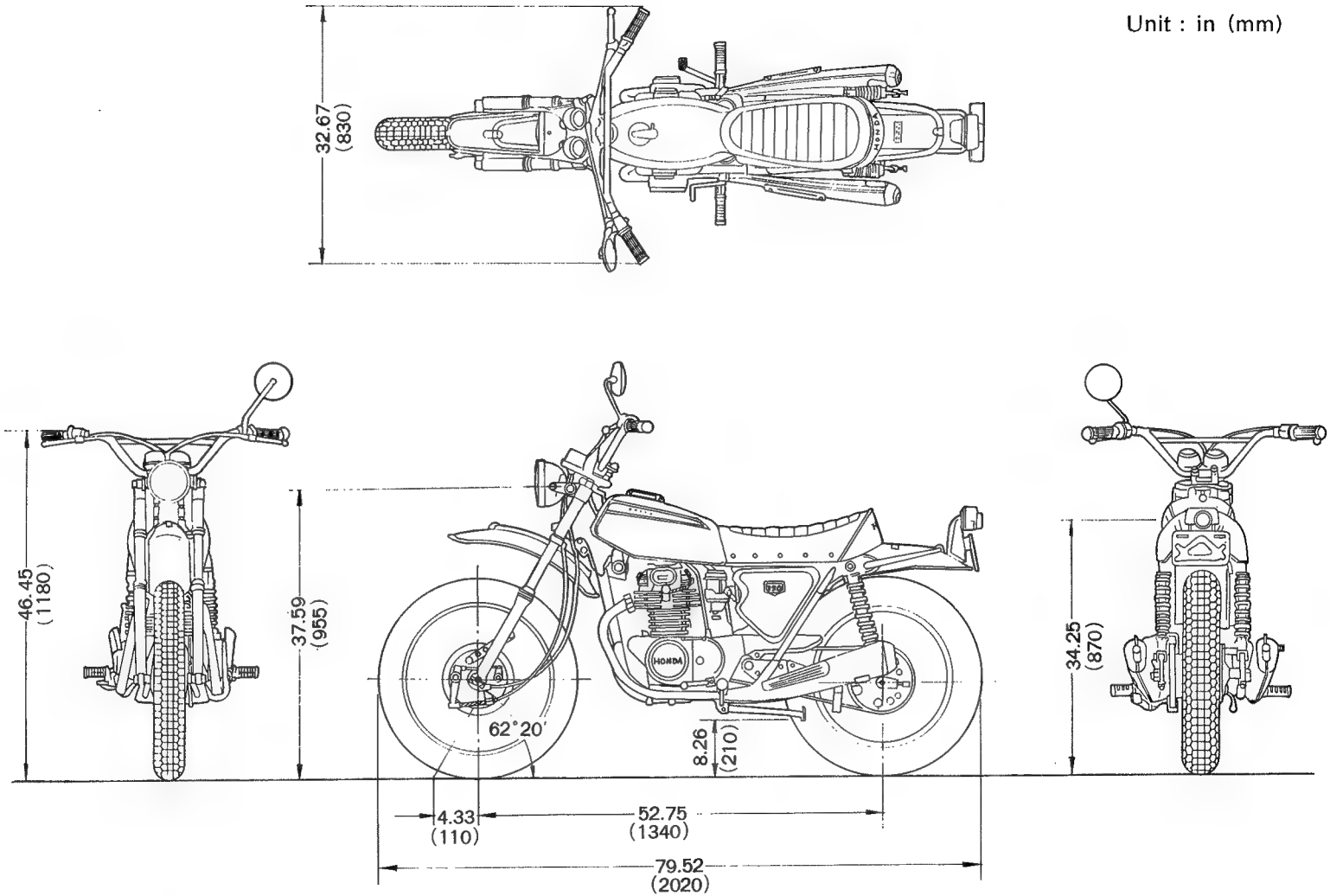


SL 350 OPERATIONAL PERFORMANCE CURVE

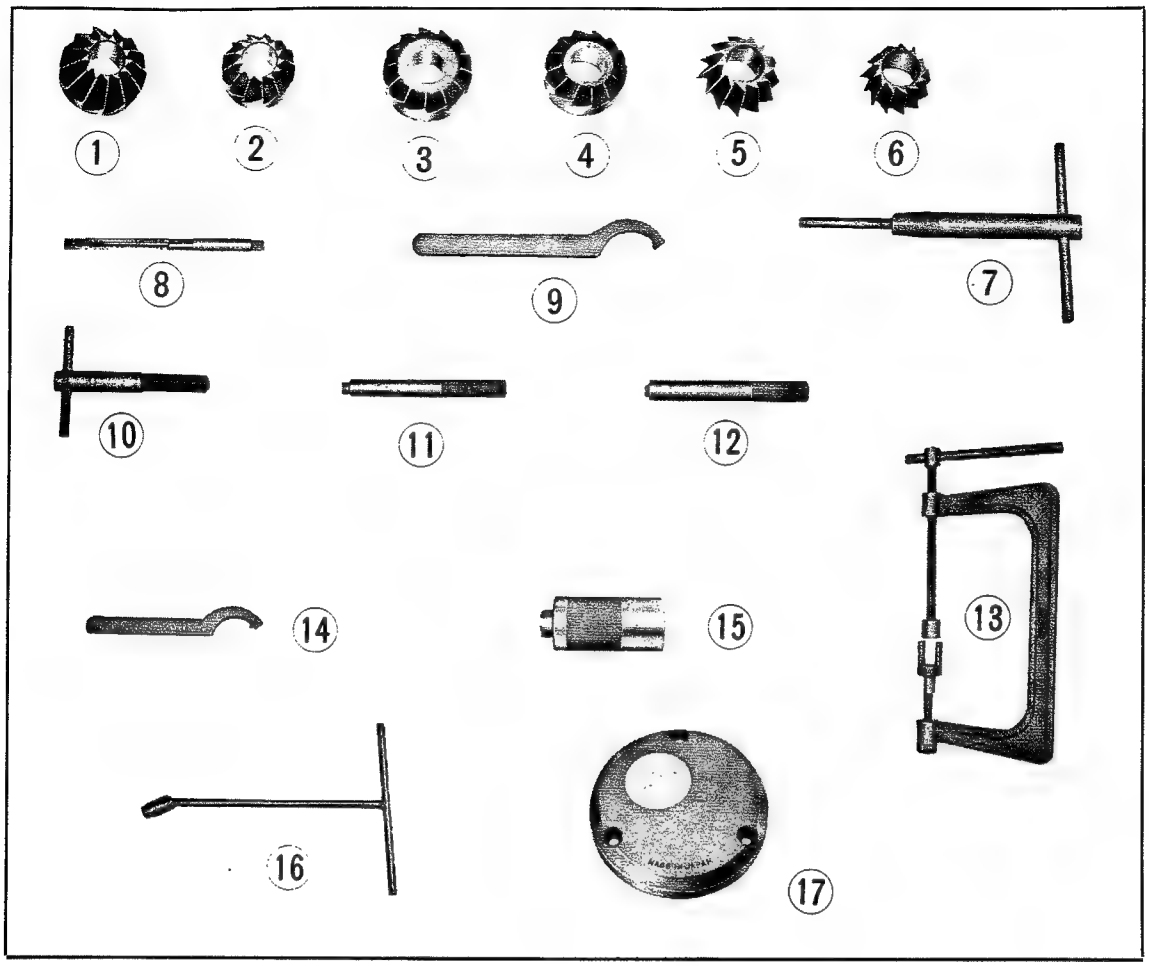


SL 350 DIMENSIONAL DRAWING

Unit : in (mm)

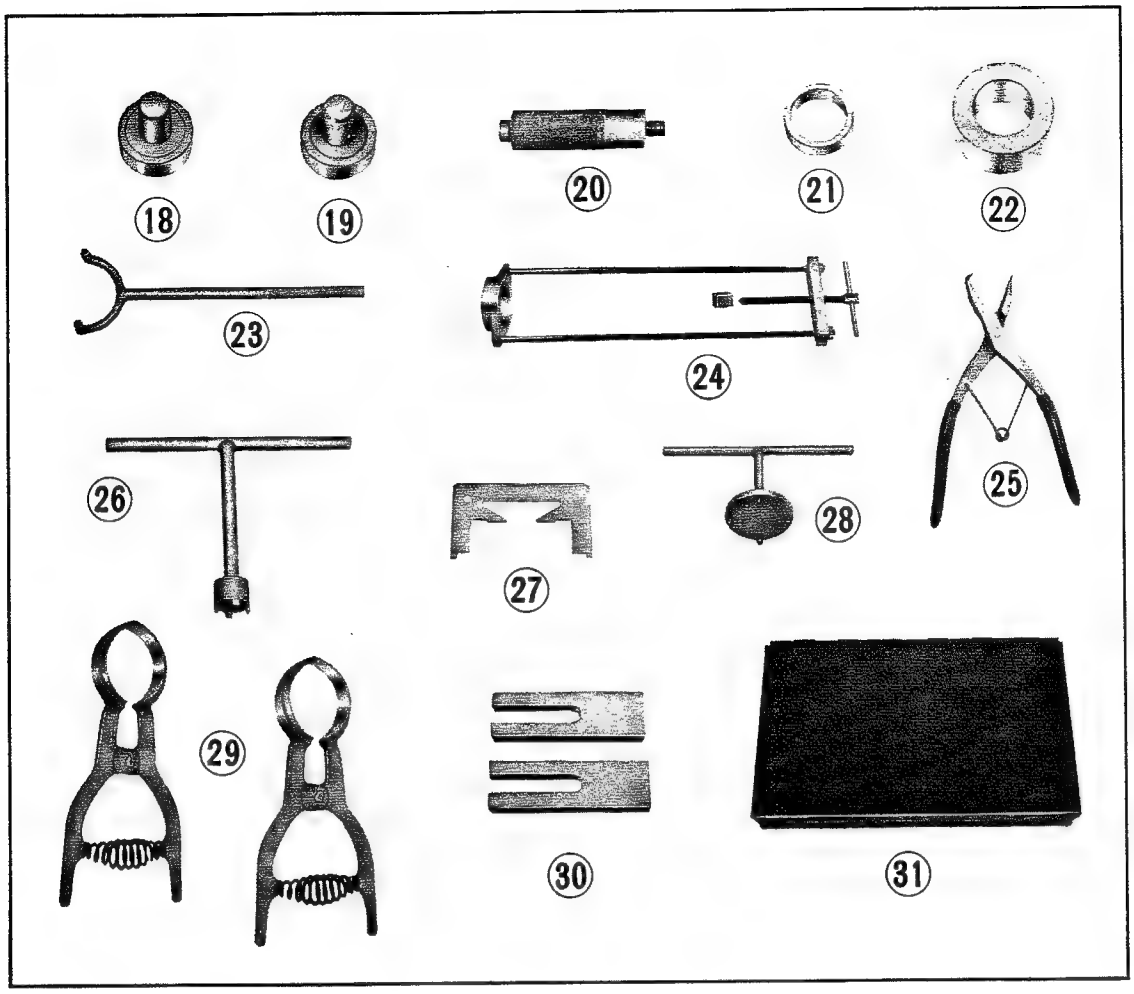


2. SPECIAL TOOLS



Ref. No.	Tool No.	Description
	07000-31001	*Special tool set for SL 350
1	07001-28601	Inlet valve seat 90° cutter
2	07002-31001	*Exhaust valve seat 90° cutter
3	07003-28601	Inlet valve seat top cutter
4	07004-28601	Exhaust valve seat top cutter
5	07005-28601	Inlet valve seat interior cutter
6	07006-28601	Exhaust valve seat interior cutter
7	07007-25002	Valve seat cutter holder 7 m/m
8	07008-28601	Valve guide reamer 7 m/m
9	07072-20001	Pin spanner, 48 m/m
10	07011-21601	T-handle dynamo rotor puller
11	07046-25901	Valve guide driver
12	07047-25901	Valve guide remover
13	07031-31001	*Valve spring compressor
14	07071-25001	Main switch pin spanner
15	07048-28601	Bearing driver
16	07093-28601	Universal joint socket wrench, 10 m/m
17	07023-28601	Dynamo inspection cover

* These tools are for use with the SL 350 only, the others are common to all series.



Ref. No.	Tool No.	Description
18	07048-31005	*Front & R, Rear wheel bearing driver attachment
19	07048-31003	*L, Rear wheel bearing driver attachment
20	07048-31007	*Bearing driver handle
21	07054-27301	Front fork oil seal driver guide
22	07054-29201	Front fork oil seal driver weight
23	07022-28701	Drive sprocket holder
24	07035-31001	*Rear cushion disassembling & assembling tool
25	07073-07401	Snap ring pliers (close)
26	07086-28301	T-handle box wrench, 16 m/m
27	07144-99963	*Float level gauge
28	07076-28601	Rear wheel bearing retainer adjusting wrench
29	07032-55101	Piston ring compressor
30	07033-25001	Piston base
31	07997-05101	Valve seat cutter case
	07790-29201	Tool case

* These tools are for use with the SL 350 only, the others are common to all series.

3. ENGINE

● GENERAL DESCRIPTION OF THE SL 350

With the exception of the carburetor setting and the dismounting and remounting procedures, the engine is identical to the CB/CL 350 series.

● DISMOUNTING THE ENGINE

1. Drain the engine oil by removing both the drain plug and the filler cap.
2. Turn the fuel cock to the STOP position. Disconnect the fuel line from the cock and then remove the fuel level tube from the bottom rear of the tank, making sure that fitting is plugged to prevent fuel from flowing. Raise the seat, move the tank to the rear to disengage it from the fuel tank rear cushion, and then separate the tank from the frame by removing it toward the rear.
3. Remove the gear change pedal and the kick starter. Remove the mufflers and take off the left rear crankcase cover. **(Fig. 1)**
4. Disconnect the drive chain at the connecting link. **(Fig. 1)**
5. Remove the carburetors by loosening the carburetor insulating band screws.
6. Disconnect the wire harness ① and the starting motor cable at the starter solenoid. **(Fig. 3)**
7. Remove the contact breaker cable connection and the high tension terminal assemblies from the spark plug.
8. Disconnect the tachometer cable at the engine.
9. Remove the seven engine hanger bolts (at the bottom of crankcase, on top of cylinder head, at the top rear of crankcase) and then dismount the engine from the right side.

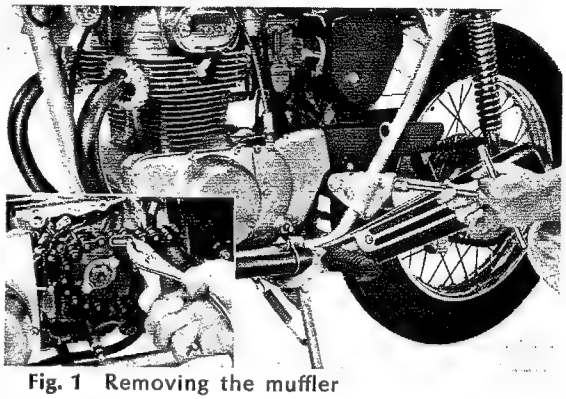


Fig. 1 Removing the muffler

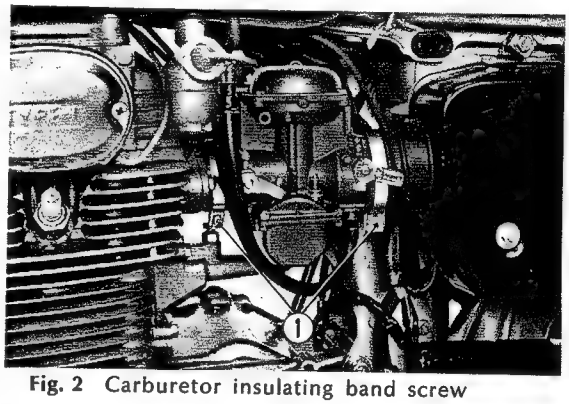


Fig. 2 Carburetor insulating band screw

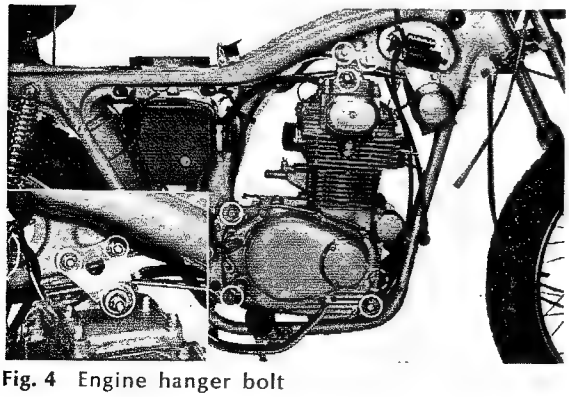


Fig. 4 Engine hanger bolt

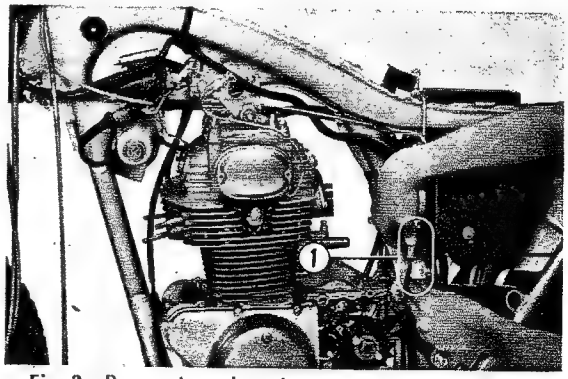


Fig. 3 Removing the electrical leads

● REMOUNTING THE ENGINE

1. The engine can be easily remounted by sliding the rear of the engine in place from the crankcase side.
2. Installing the rear upper crankcase mounting bolt first will permit easy aligement of the remaining crankcase mounting bolts, first the lower and then the cylinder head upper mounting bolts.

Note:

Torque all engine hanger bolts to 25.3–32.5 ft-lbs (250–350 kg-cm).

3. The installation details for the engine remounting are performed in the reverse order of the removal procedure.

Note :

1. The drive chain joint clip ① should be facing in the correct direction, the closed end of the link clip should point toward the direction of the normal chain rotation. **(Fig. 5)**
2. The steel ball ① must be in the clutch lever ② housing when installing the left crankcase rear cover. **(Fig. 6)**

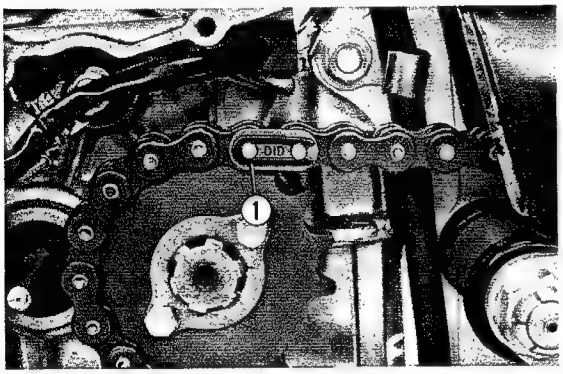


Fig. 5 Drive chain joint clip direction

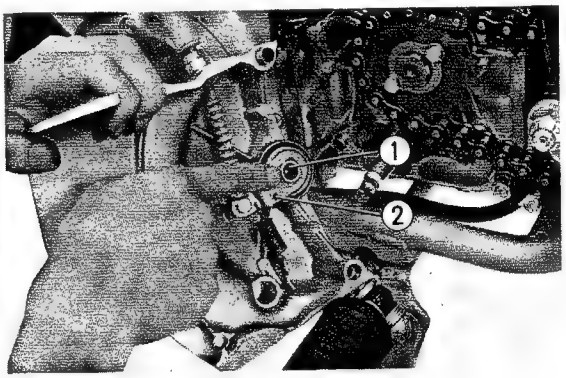


Fig. 6 Left crankcase rear cover

● CARBURETOR

☆ Specifications

The carburetor specifications are summarized below. For further information and adjustment, refer to 250·350 Shop Manual.

Item \ Model		SL 350	
		Primary	Secondary
Setting mark		SI. 3 A	
Venturi bore dia		11. 6 mm (0. 456 in)	28. 0 mm (1. 102 in)
M. J. (Main jet)		#70	#105
N. J. (Needle jet)		2. 6 mm(0. 102 in)×2. 8 R	
J. N. (Jet needle)		2. 475 mm(0. 0974 in), 4°00′	
Throttle valve		1. 00 mm(0. 039 in), 13°30′	
S.J. (Slow jet)	AB 1	0. 8 mm(0. 031 in)×2	
	AB 2	0. 8 mm(0. 031 in)×2	
	AB 3	0. 8 mm(0. 031 in)×2	
Float height		26±0. 5 mm	

4. FRAME

● HANDLEBAR

☆ Description

The handlebar is a ladder type similar to that used on the CL 350. It is designed slightly elevated for use especially suited to on and off road riding and to lessen riding fatigue from long road work. (**Fig. 6**) Removal, inspection, and installation are the same for the CL 350, therefore, refer to 250·350 Shop Manual.

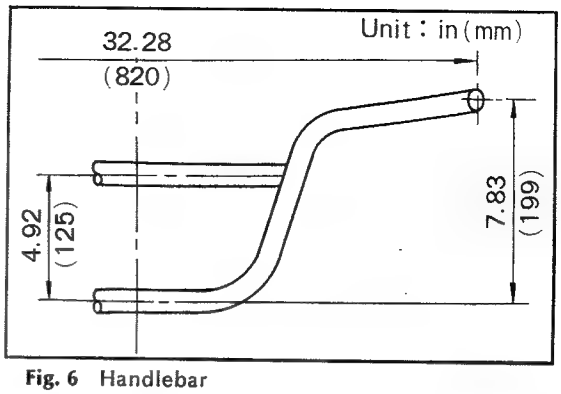


Fig. 6 Handlebar

● FORK TOP BRIDGE

☆ Description

The fork top bridge and the handle pipe upper holder are painted flat black to prevent annoying reflection. Further, to provide good steering stability on rough roads, the fork top bridge is used to clamp the top of the front fork. The fork top brige is made larger, incorporating two mounting bolt holes and a steering stem setting bolt hole (**Fig. 7**).

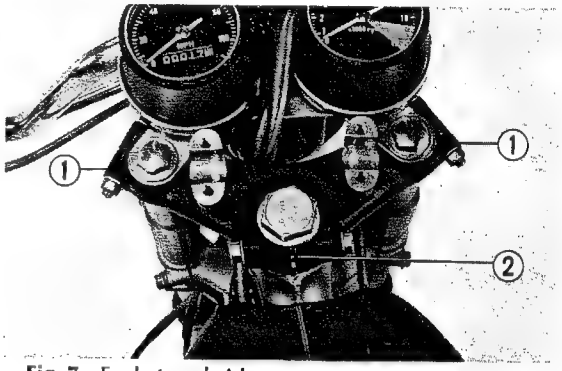
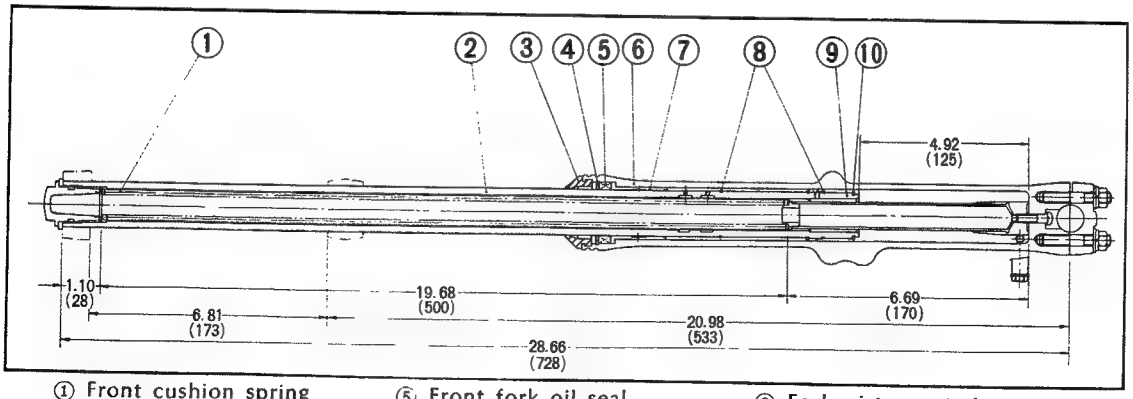


Fig. 7 Fork top bridge
① Fork mounting bolt
② Steering stem setting bolt

● FRONT CUSHION

☆ Description

Front fork is assembled into a complete unit by the fork bottom bridge, axle and the fork top bridge and their respective mounting bolts. This three-point mounting design provides a highly rigid unit for good stability. The front cushion is a telescopic type with a 6.7 inch (170 mm) range of travel.



① Front cushion spring
② Front fork pipe
③ Front fork dust seal
④ Internal snap ring
⑤ Front fork oil seal
⑥ Front fork bottom case
⑦ Front fork pipe guide
⑧ Fork piston set ring
⑨ Front fork piston
⑩ Fork piston stopper ring

Fig. 8 Sectional view of front cushion

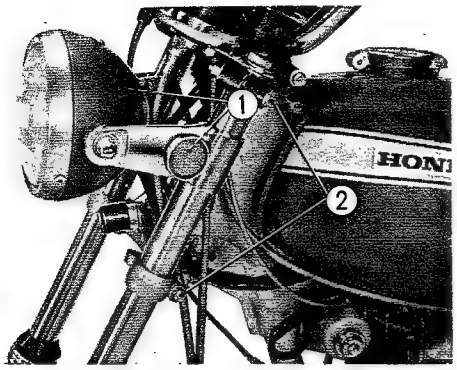


Fig. 9 Removing fronts fork assembly

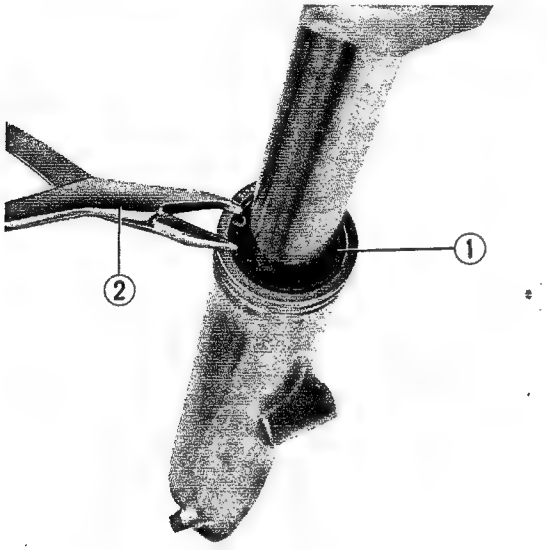


Fig. 10 Removing snap ring

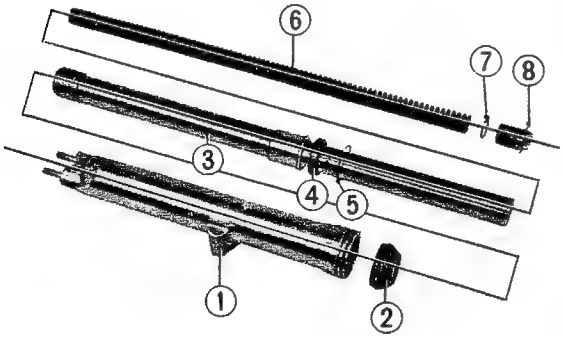


Fig. 11 Component parts of front fork
① Front fork bottom case
② Front fork dust seal
③ Front fork pipe
④ Front fork oil seal
⑤ 44 mm internal snap ring
⑥ Front fork cushion spring
⑦ 24 mm internal snap ring
⑧ Front fork bolt

☆ Disassembly

1. Raise the front wheel off the ground by placing a support under the engine.
2. Remove the front brake and speedometer cables from the front wheel panel.
3. Remove the front wheel.
4. Remove the reflectors ① and loosen the headlight mounting bracket screws. (**Fig. 9**)
5. Loosen the front fork fixing bolts ② and remove the front fork assembly from the frame. (**Fig. 9**)
6. Remove the front fork top bolt and drain the oil.
7. Remove the front fork dust seal.
8. Remove the internal snap ring ① by using a special pliers (Tool No. 07073-07401) ②. (**Fig. 10**)
9. Pull out the front fork pipe from the front fork bottom case.
10. Remove the front fork piston.

☆ Inspection

1. Front fork bottom case
   Check for cracks and distortion. The cylinder case interior is checked with a cylinder gauge ①. (**Fig. 12**)

Unit: in (mm)

Item	Standard value	Serviceable limit
Cylinder diameter	1.4763–1.4779 (37.5–37.539)	1.4834 (37.680)

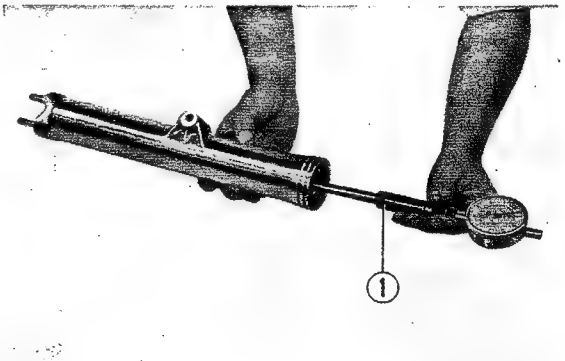


Fig. 12 Measuring inner diameter of bottom case

2. Front fork piston
   Check the piston ① with a micrometer ②. (**Fig. 13**)

Unit: in (mm)

Item	Standard value	Serviceable limit
Piston diameter	1.4722–1.4732 (37.395–37.42)	1.4718 (37.385)

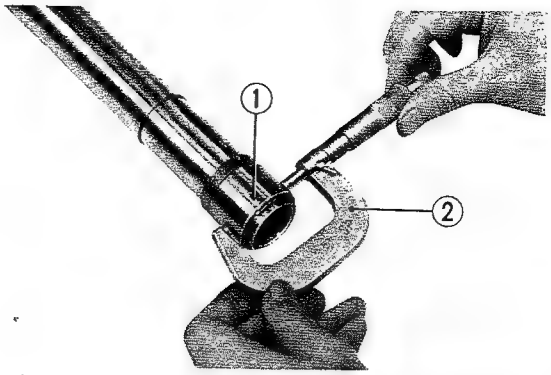


Fig. 13 Measuring diameter of fork piston

☆ Reassembly

Perform the reassembly in the reverse order of disassembly.

Note:

1. It is recommended that all set rings, stopper rings and snap rings be replaced with new items.
2. Apply petroleum resistant grease between the main and dust lips of the front oil seal. Install the oil seal ① into the front wheel bottom case with the oil seal driving guide ② (Tool No. 07054-27301) and weight ③ (Tool No. 07054-29201). (**Fig. 14**)
3. Install the snap ring positively into the retainer groove.
4. Assemble the cushion spring into the case with the smaller pitch of the coil toward the bottom.
5. After installing the front fork on the frame, fill the fork cylinder with 11~11.6 cu-in (180~190cc) SAE 10W-30 oil of good grade.
6. If the front fork mounting is misaligned, the steering will pull to one side, therefore, before installing the wheel, align both front axle holes by inserting a shaft through the axle holes. (**Fig. 15**)

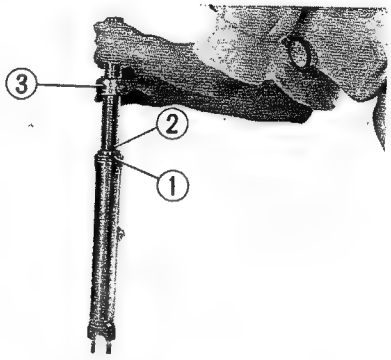


Fig. 14 Installing oil seal

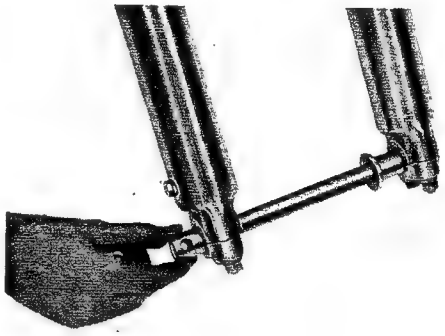


Fig. 15 Aligning both front axle holes

● STEERING STEM

☆ Description

The steering stem is mounted into the frame head pipe supported by the upper and lower steering balls. An oil damper bracket which mounts the steering oil damper is installed on the right side of the fork bottom bridge together with the horn. Its function is to improve steering, prevent handle vibration, and dampen shock when travelling on rough roads. A handle lock is incorporated into the fork bottom bridge, identical to the CL 350, and it can be removed as a complete assembly by inserting the key, turning counterclockwise and pulling. When performing the installation, do not forget to install the handle lock spring.

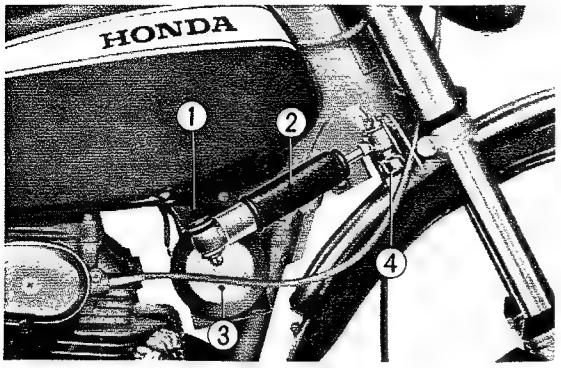


Fig. 16 Steering oil damper
① Steering oil damber brocket
② Steering oil damper
③ Horn
④ Fork bottom bridge

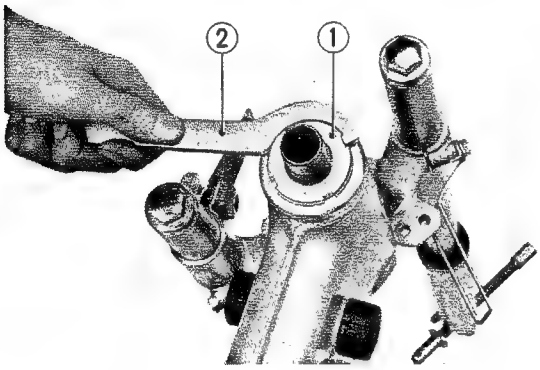


Fig. 17 Removing steering stem top nut

☆ Disassembly

1. Disconnect the front brake cable from the brake arm and the clutch cable at the lower end. Disconnect the throttle cable at the carburetor and the wiring harness located within headlight case. Remove handlebar by unscrewing the four 8 mm bolts from the handle pipe holder clamps.
2. Remove the front wheel.
3. Remove the top bridge plate.
4. Remove the steering oil damper from the bottom bridge plate and the damper bracket with horn.
5. Remove the headlight and front fork.
6. Remove the steering stem top nut ① using a hook spanner (Tool No. 07072-20001) and pull the stem out the bottom. **(Fig. 17)**

Note:
Do not drop out the steel balls during the steering stem removal.

☆ Inspection

1. Check the steering stem for bend and deformation.
2. Check the steel balls for wear and cracks.
3. If heavy steering is experienced while riding, it is probably due to either the worn steel balls or the broken balls. Replace the balls to correct the trouble.
4. Check the steering oil damper for dents, damage or fluid leakage. If defective, it must be repaired or replaced.

☆ Reassembly

Perform the reassembly in the reverse order of disassembly, however, special attention must be given to the following points.

Note:
1. Use sufficient grease when installing the steel balls of 1/4 in. (6.35 mm) dia. into the ball races (18 for the upper and 19 for the lower races). When removing the steering stem, care should be taken not to drop any steel ball.
2. When mounting the steering stem, the steering stem top nut should be tightened so that only slight pressure is applied and there is no slackness in the steering cones. To check tightness of the steering, tilt the front wheel to either side slightly and let the handle to start moving by its own weight. If the handle does not move by itself or there are gape between races, readjust the steering stem top nut.

● FUEL TANK

☆ Description

The fuel tank is mounted on the frame body directly above the engine and is installed on the frame body and through the fuel tank rubber cushion. Stripe lines are painted on both sides of the tank. A flip open type of tank cap is used to facilitate refueling. Removal and installation procedures are identical to the CL 350, therefore, refer to the 250·350 Shop Manual.

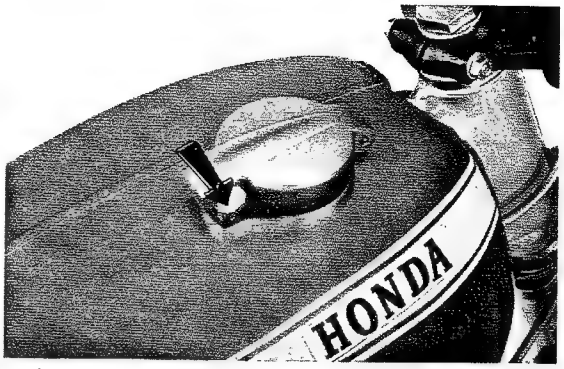


Fig. 18 Fuel tank

● FRAME

☆ Description

The frame is of a semi-double type tubular steel construction, similar to that of the CL 350. This design is particularly suited for rough road. It is further strengthened by the addition of a sub tube bridge welded between the sub tubes. A fender stay is welded on the rear extension of the half frame for mounting the rear fender.

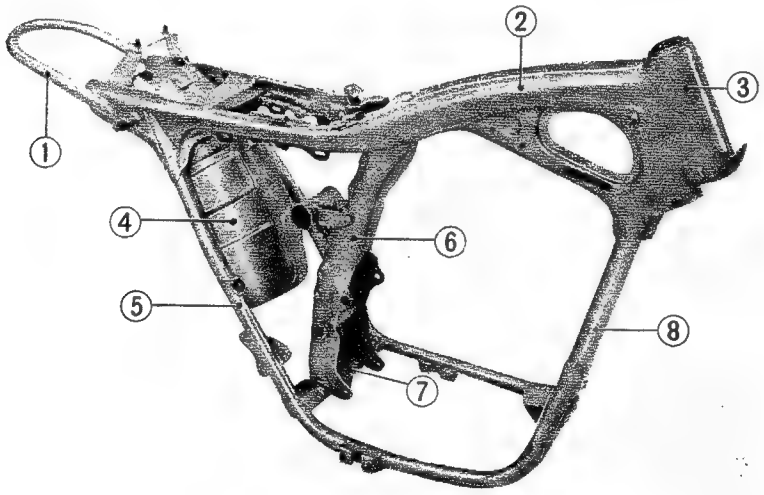


Fig. 19 Frame

① Rear fender stay
② Half frame
③ Head pipe
④ Sub tube bridge
⑤ Sub tube
⑥ Half pillar
⑦ Lower cross member
⑧ Front down tube

☆ Disassembly

1. Engine dismounting
   Refer to engine dismounting section on page 7.
2. Seat
   Unlock the seat latch, raise the seat and remove the two 8 mm hex. nuts at the seat hinge. Then separate seat from the frame.
3. Fuel tank
   When dismounting the engine, the fuel tank is also removed at the same time. Refer to page 7.
4. Air cleaner
   Remove two air cleaners as described on page 15.

5. Steering handle, front suspension and wheel.
   Romove these parts as described on page 10~12.
6. Rear wheel
   Remove the rear wheel as described on page 16.
7. Rear cushion
   Remove the rear cushion as described on page 17.
8. Rear fork
   Remove the rear fork as described on page 16.

☆ **Inspection**

1. Inspect the weld joints for any breaks or cracks and the steering pipe for twist and bends.
2. Check the frame paint coating for rust spots.

☆ **Reassembly**

Perform the assembly in the reverse order of disassembly.

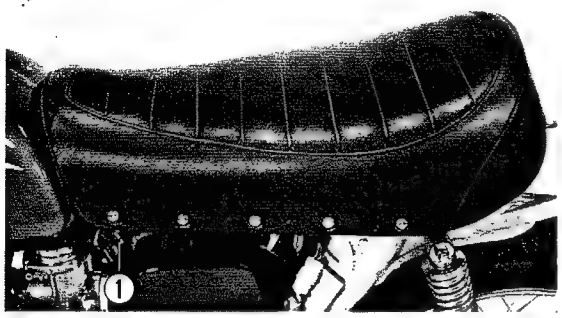


Fig. 20 Seat
① Seat latch

● SEAT

☆ **Description**

The center of the seat is made into a depression changing gradually from a flat surface to a series of ridges covered with vinyl leather. This provides good seat holding on rough roads: also, the sponge rubber cushion used in the seat absorb shocks and vibration for more comfortable riding. The bead stiching on both sides has been replaced with rivets for greater strength.
The seat is unlocked and raised toward the rear for access to the battery, selenium rectifier, starter solenoid and the winker relay for inspection. Refer to the 250·350 Shop Manual for removal and installation procedure.

● MUFFLER

☆ **Description**

The exhaust pipes are mounted to their respective right and left cylinder head with exhaust pipe joints and 6 mm bolts and nuts. A double split exhaust pipe collar together with the packing at the mounting flange prevents exhaust leaks at the joint. **(Fig. 22)**

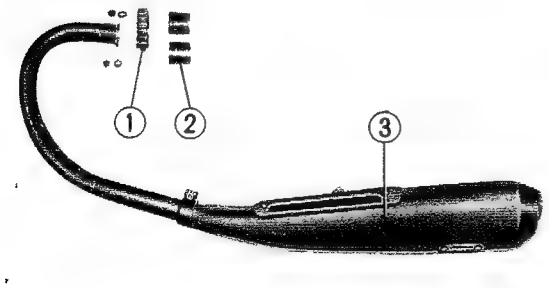


Fig. 21 Muffler
① Exhaust pipe joint flange
② Exhaust pipe joint collar
③ Muffler assembly

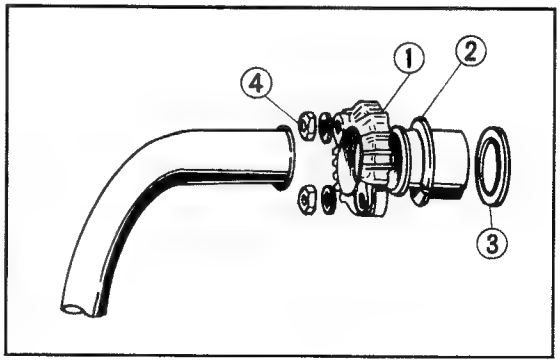


Fig. 22 ① Exhaust pipe joint
② Exhaust pipe joint collor
③ Exhaust pipe gasket
④ 8 mm hex. nut

The muffler and the exhaust pipe are an integral unit which is mounted the units on the mufler bracket with a 10 mm hex. bolt. A US Forestry Service approved spark arrester is installed within the muffler to prevent the emmission of hot sparks when riding through forest and mountainous regions. Attractive muffler protectors are mounted to protect rider from burn.

Note:

Refer to the 250·350 Shop Manual for removal, inspection and installation procedure. Disconnection of the muffler and exhaust pipe or disassembly of the muffler cannot be done.

● AIR CLEANER

☆ Description

Two air cleaner elements are attached, one on each side of the frame and both elements are interconnected with a passage built in the frame. Both elements are made of filter paper which requires dusting at specified intervals.

☆ Disassembly

1. Remove the air cleaner cover by pulling off at the rubber mount.
2. Unscrew air cleaner fixing nut ①, attaching bolt ② and connecting tube screw ③ and then withdraw the cleaner from the frame. **(Fig. 23)**

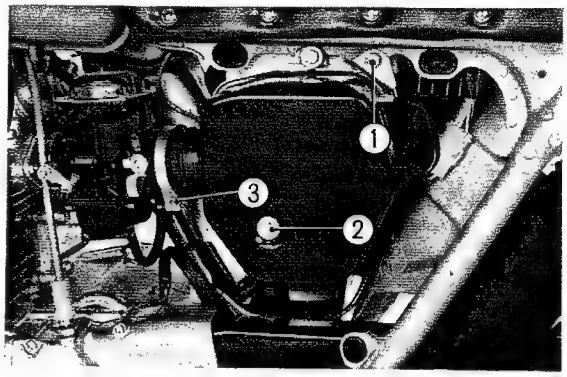


Fig. 23 Removing air cleaner

☆ Inspection

1. Holding the element, tap it on a flat board to remove all the dirt trapped in the element. Apply a light pressure of compressed air from the inside, blowing out to remove any dirt still trapped in the element. **(Fig. 24)**
2. Check the element to ensure that it is not split or cracked. Also check the bonded section to ensure that the joints are not cracked or open. If doubtful, install new item.
3. Check the rubber packings ① installed on both the right and left passage openings for damage. Replace if necessary. **(Fig. 24)**

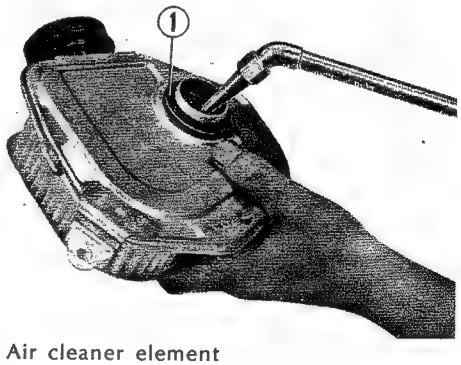


Fig. 24 Air cleaner element

☆ Reassembly

Perform the reassembly in the reverse order of disassembly.

Note: Be sure to install the packing.

● REAR FORK

☆ Description

The rear fork supports the wheel and pivots at the rear fork pivot bolt to proivde a swing action.

It is constructed of steel tubing for greater strength and durability and mounted throught pivot bushing on lock side and lubricated with grease for smooth operation.

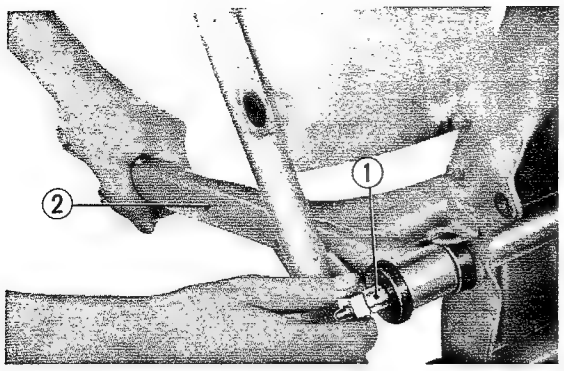


Fig. 25 Removing rear fork

☆ Disassembly

1. Place a block under the engine to raise the rear wheel off the ground.
2. Remove the chain, the rear wheel and the drive chain guard.
3. Pull out the rear fork pivot bolt ① and remove the rear fork ②. (**Fig. 25**)

☆ Inspection

1. The rear fork should be inspected for distortion. Insert the rear axle through both pivot holes in the rear fork and check the rear fork for alignment.
2. Measure the inside diameter of the rear fork pivot bushing and replace if beyond the serviceable limit.

Unit: in. (mm)

Item	Standard value	Serviceable limit
Inside diameter of bushing	0.787~0.789 (20.000~20.033)	0.795 (20.18)

3. Check the rear fork bolt for bend. Rotate the bolt on a V-bloc and measure the amount of bend with a dialgauge.

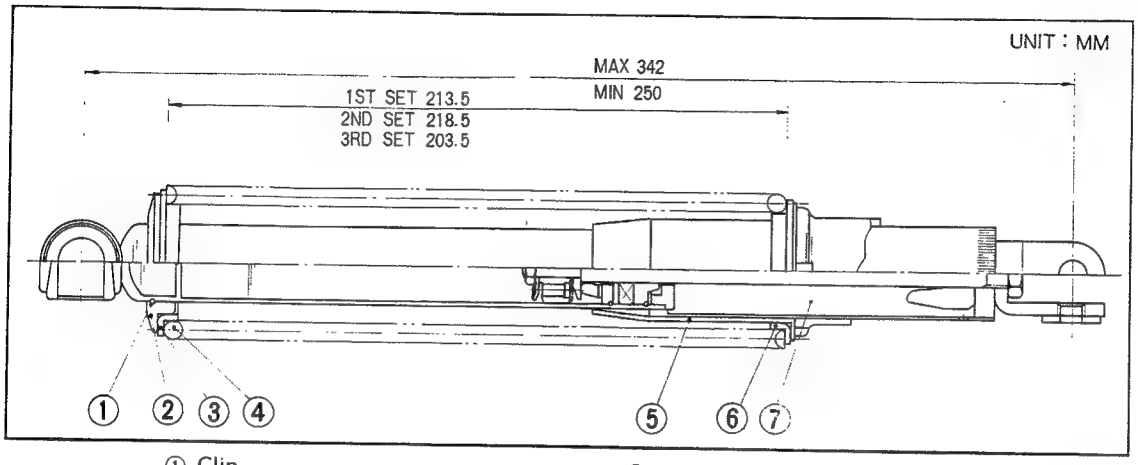
☆ Reassembly

1. Apply a liberal of grease on the pivot collar and assemble it into the rear fork. Insert the pivoit bolt from the right side, and then install and tighten the 14 mm self lock nut. Tightening torque is 65.0–79.5 lb-ft (900–1200 kg-cm).
2. Install the dirve chain guard and the rear wheel.
3. Install the drive chain and the rear brake pedal and drive chain tension.

● REAR CUSHION

☆ Description

A De Carbon type damper containing nitrogen gas under high pressure is contained within the cylinder to maintain a pressure against the oil.
This prevents bubbles from being produced in the oil during compression. It assures positive damping action. The spring force can be adjusted to three positions according to carring load and riding condition. The stroke of the rear cushion is 3.62 in. (92 mm).



① Clip
② Rear shock spring seat stopper
③ Rear shock spring upper seat
④ Rear shock spring
⑤ Rear shock spring guide
⑥ Rear shock spring lower seat
⑦ Rear shock damper unit

Fig. 26 Sectional view of rear suspension

☆ Disassembly

1. Remove the blind nut from the upper mounting bolt of each rear shock spring. Remove the lower mounting bolt and withdraw the rear shock spring.
2. Remove the spring ① from the shock spring unit by using the rear cushion disassemling and assembling tool (Tool No. 07035-31001) ②. **(Fig. 27)**
   Turning the handle of the special tool clockwise will gradually compress the spring, permitting the removal of the spring upper seat.
   As the handle is turned counterwise, the special tool can be separated from the cushion spring allowing the damper unit to be disassembled.

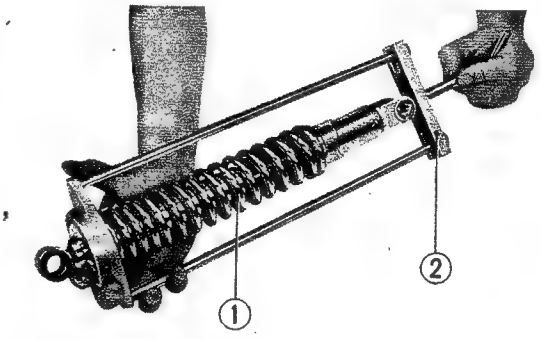


Fig. 27 Disassembling rear shock spring

☆ Inspection

1. Check the body of the damper for dent or damage, for fluid leakage or lack of damping effect. If any of these defects are found, replace the whole unit as the damper is not repairable.
   Caution:
   The cylinder is pressurized by the nitrogen gas to approximately 568.8 psi (40 atm.), therefore, no attempt should be made to disassemble the cylinder.

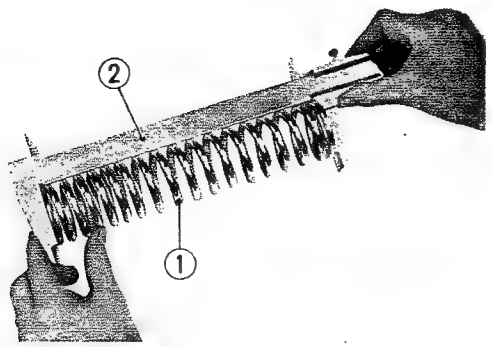


Fig. 28 Measuring free length of spring

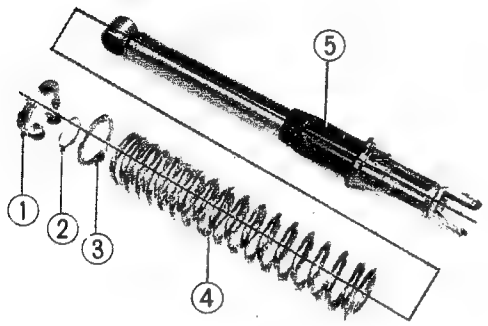


Fig. 29 Component parts of rear cushion
① Rear shock spring seat stopper
② Clip
③ Rear shock spring upper seat
④ Rear shock spring
⑤ Rear damper unit

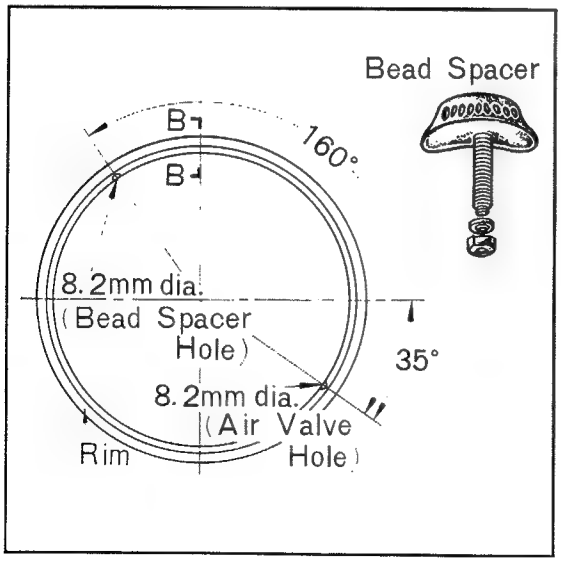


Fig. 30 Tube air valve hole and bead spacer hole

2. Check the free length of the spring ① with a vernier caliper ②. **(Fig. 28)** If it measures less than the specified value, the spring should be replaced.

Unit: in (mm)

Item	Standard value	Serviciable limit
Spring free length	8.77 (222.9)	8.54 (217)

3. Damping force connot be measured, therefore the test is performed by compressing the rear damper unit by hand; normal operating condition is indicated by a greater resistance on the extension stroke than on the compression stroke.

☆ Reassembly

Install the rear shock spring onto the rear damper unit with the tapered end of the coil toward the top.
Perform the reverse order of disassembly.

● FRONT WHEEL

☆ Description

Practically all of the parts such as the wheel bearings, wheel hub, brake backing plate, brake drum and shoes, spokes and etc., are the same as those for the CL 350.
The major differences are in the semi-knobby tires (3.25-19-4 PR) used on the SL 350 for better holding when travelling over rough roads and a newly desined rim having a 8.2 mm hole for the installation of bead spacer to provide good contact between the rim and tube, and preventing them from shifting due to shocks when travelling over bad roads or when making sudden stops. When changing to standard tires for city or high speed riding, there is no need to replace the rim or remove the bead spacer.
The procedure for the removal and installation of the front wheel assembly, bearing removal, serviceable limit of the drum wear, brake shoe and tire replacements are the same as for the same as for the other series and should be referred to the 250·350 Shop Manual.

● TIRE RECOMMENDATION

The following recommended road tires should be installed for street and high way riding. One of the following classified groups is recommended. Do not use front and rear tires in different classified groups as a set.

Group	Brand	Manufacturer	Size	Air pressure (cold)
①	Front: B.S. RS-10 Rear: B.S. RS-10	Bridgestone Tire Co., Japan Bridgestone Tire Co., Japan	3.00-19 3.50-18	26 psi 28 psi
②	Front: B.S. Super speed 21F Rear: B.S. Super speed 21R	Bridgestone Tire Co., Japan Bridgestone Tire Co., Japan	3.25-19 4.00-18	28 psi 28 psi
③	Front: Dunlop F3 Rear: Dunlop K87	Dunlop Rubber Co., Japan Dunlop Rubber Co., Japan	3.25-19 3.50-18	26 psi 28 psi

Note:

The specifications for off-the-road running are indicated below.

Tire wheel	Brand	Size	Air pressure (cold)
Front	Dunlop trail universal	3.25-19	14 psi
Rear	Dunlop trail universal	4.00-18	17 psi

● REAR WHEEL

☆ Description

Similar to the front wheel, the parts for the rear wheel are the same as those used on the CL 350 with the exception of the semi-knobby tire and the rim designed for the installation of two bead spacers for off-the-road riding.

For disassembly, inspection, repair and re-assembly, refer to the 250·350 Shop Manual. The normal tire change is the same as for the front wheel and should be referred to in the section of tire recommendation.

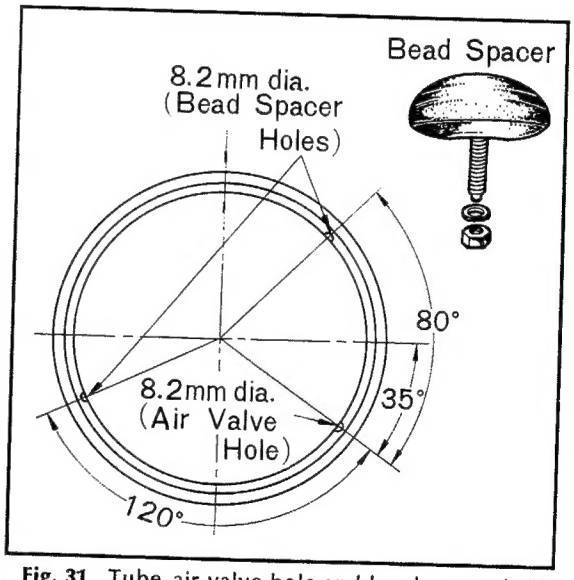


Fig. 31 Tube air valve hole and bead spacer holes

5. ELECTRICAL

● GENERAL DESCRIPTION

All parts used in the electrical system are the same as those used in the CL 350, with the exception of the ignition coil, horn and speedometer. As a safety and emergency feature the ignition circuit is exposed and a kill switch has been incorporated to shut off the engine.
Description of the special parts.

☆ Ignition coil

The wires in the harness connecting the fuse, condenser and breaker points are of a larger size.

☆ Horn

The center distance of the horn braket mounting holes has been made greater to permit the use of the same bolts for mounting the steering damper braket.

☆ Speedometer

The design of the dial plate has been changed to indicate the speed ranges for on-the-road riding, however, the speedometer main unit has not been changed.
Refer to the 250·350 Shop Manual for information of the disassembly, inspection and reassembly of the respective components.

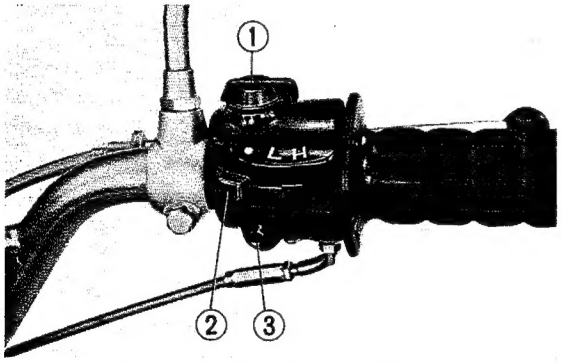


Fig. 32 ① Ignition switch ③ Starter switch
② Headlight Control switch

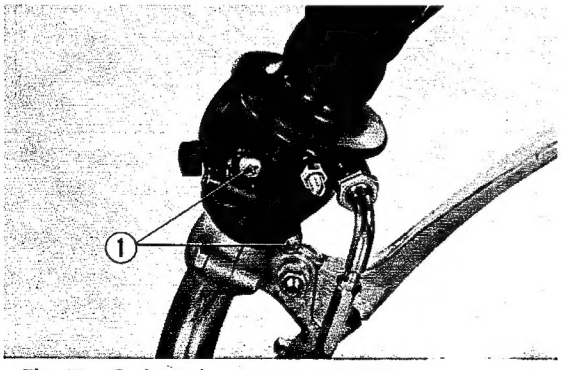


Fig. 33 ① Switch mounting screw

● STARTER LIGHTING KILL SWITCH

The starter lighting kill switch is located on top of the right handle bracket. **(Fig. 32)**

☆ Disassembly

1. Separate the switch bracket by removing the two switch mounting screws ①. **(Fig. 33)**
2. Disconnect the throttle cable and connector.
3. Disconnect the wiring harness within the head light case and remove the switch assembly.

☆ Inspection

1. Check to make sure that the resepective switch positions are functioning properly.
2. Push the starter button and check to see that the starting motor turns over.
3. Switch on the main key switch and check to see that the headlight control switch is functioning properly by setting the respective switch positions.

☆ Reassembly

Perform the reassembly in the reverse order of disassembly.

Note : When installing the switch lower housing on the handle bar, make sure that the hodling pin is inserted into the handle bar stop hole and is tightened together with the switch upper housing.

WIRING DIAGRAM